

REPORT

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Site health and safety plan - prepared for: geological mapping  
remedial action, 881 hillside - doe Rocky Flats Plant

# **SITE HEALTH AND SAFETY PLAN**

**Prepared for:**

## **GEOLOGICAL MAPPING REMEDIAL ACTION, 881 HILLSIDE DOE - ROCKY FLATS PLANT**

**Prepared by:**

**ROY F. WESTON, INC.  
215 UNION BOULEVARD, SUITE 550  
LAKEWOOD, COLORADO 80228**

**WESTON Work Order No. 2029-33-09**

**January 1992**

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**For**

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REMEDIAL ACTION, 881 HILLSIDE  
DOE — ROCKY FLATS PLANT**

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TASK 009

HEALTH AND SAFETY PLAN  
FOR  
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DOE - ROCKY FLATS PLANT

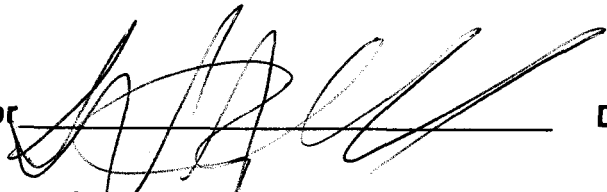
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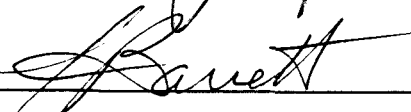
Project Manager  Date 1/7/92

Project Director  Date 1/7/92

Regional Safety Officer Michael Bradshaw Date 1/30/92

Corporate Health and  
Safety Officer \_\_\_\_\_ Date \_\_\_\_\_

Site Health and  
Safety Coordinator  Date 1-31-92

Prepared by  Date 01.07.92

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## **1.0 INTRODUCTION**

### **1.1 Application**

This site Health and Safety Plan (HASP) has been developed by the Roy F. Weston, Inc. (WESTON) for activities relating to the geological characterization of the French Drain excavation at the 881 Hillside Phase IIB remediation project at the Department of Energy's (DOE) Rocky Flats Plant (RFP). This HASP mandates the minimum requirements of physical, chemical, and radiological health and safety for all WESTON employees, subcontractors, and authorized visitors. The plan also provides parameters for health and safety decision making by the designated Site Health and Safety Coordinator, (SHSC).

### **1.2 Preparation of the HASP**

The RFP 881 Hillside HASP has been prepared by WESTON's industrial hygiene department. The HASP team consisted of Thomas Bauckham, Certified Industrial Hygienist and Thomas Barrett, Project Industrial Hygienist. The contents of this plan are based on a detailed briefing provided by Mr. Mark Burmeister of EG&G regarding the scope-of-work, the requirements of 29 CFR 1910.120, the EG&G health and safety plan for 881 Hillside, and applicable OSHA regulations and DOE orders.

### **1.3 Description of WESTON's Field Activities**

There are two primary reasons for WESTON's involvement in the french drain Geological Mapping project. The first of which is the documentation of the geologic units and features exposed during excavation. The second aspect of WESTON's involvement in the identification, for engineering requirements, the colluvium/bedrock contact. The identification of this surface is critical to assure compliance with the IRAP. The bulleted descriptions of the individual tasks are presented below.

- |               |   |
|---------------|---|
| <b>Task 1</b> | • Geological Mapping, at a scale of 1 inch to 2 feet of the north wall of the trench excavation. Mapping to include lithologic and structural (faults, joints, fractures) features.   |
| <b>Task 2</b> | • Acquisition of soil and rock samples for physical property characterization tests including, grain size analysis, Atterburg Limits and other physical tests determined as necessary.  |
| <b>Task 3</b> | • Preparation of a work plan describing procedures and protocol for mapping and reporting trench mapping activities. This work plan will eventually be incorporated by EG&G into the Rocky Flats Standard Operating Procedures (SOP). |
| <b>Task 4</b> | • Provide engineering interpretation and recommendations regarding slope stability and excavation bedrock penetration as requested by EG&G Project Manager.   |
| <b>Task 5</b> | • Preparation of appropriate written documentation regarding the results of the mapping.  |



- Task 6**      •      Preparation of appropriate presentation documentation including plans, figures, and drawings.
- Task 7**      •      Collection of surficial soil samples within operable unit No. 1. The data obtained from this exercise shall be used to support the baseline risk assessment, the feasibility study, and remedial design.

The description of the proposed tasks are brief, however, the work plan will provide extensive descriptions of Tasks 1, 2, 5, and 6. Tasks 3 and 4 are relatively self-explanatory.

#### 1.4

#### Background of 881 Hillside

A comprehensive, phased program of site characterization, remedial investigations, feasibility studies, and remedial/corrective actions is in progress at the Rocky Flats Plant (RFP). These investigations are pursuant to the 1986 Compliance Agreement among the Department of Energy (DOE), Environmental Protection Agency (EPA), and the Colorado Department of Health (CDH), which addresses hazardous and radioactive mixed waste management at the Plant. Analysis of hydrogeological and hydrogeochemical characterization data obtained during installation-wide sampling in 1986, identified four areas as probable sources of environmental contamination, with each area containing several sites. The 881 Hillside Area was assigned the highest priority of the four due to elevated concentrations of volatile organic compounds (VOC) in the alluvial groundwater and the proximity of the area to South Interceptor Ditch and Woman Creek. From 1951 to 1972, portions of the 881 Hillside Area were used for oil sludge disposal, chemical burial, liquid disposal, solvent drum storage, fire damage refuse disposal, and disposal of potentially contaminated asphalt and soil. These practices have been discontinued [1]. Regulatory agencies, DOE and EG&G have agreed that enough historical events have occurred at the 881 Hillside supported by some environmental sampling data to merit interim restoration activities along with site characterization at this time.

The twelve sites located with Operable Unit 1, the 881 Hillside Area, are shown on Figure 1-1 along with the Solid Waste Management Unit (SWMU) designations. These include:

1. oil sludge pit (SWMU 102)
2. chemical burial site (SWMU 103)
3. liquid dumping site (SWMU 104)
4. out-of service fuel tank site (SWMU 105.1)
5. out-of service fuel tank site (SWMU 105.2)
6. outfall site (SWMU 106)
7. hillside oil leak site (SWMU 107)
8. multiple solvent spill site (SWMU 119.1)
9. multiple solvent spill site (SWMU 119.2)
10. radioactive site - 800 Area Site #1 (SWMU 130)
11. sanitary waste line leak site (SWMU 145.),and
12. building 885 drum storage site (SWMU 177)

The following site descriptions are summarized from the 1990 Dept. of Energy Draft Phase III RI/FS Work Plan [2].

Oil Sludge Pit Site (SWMU 102)

Approximately 30 to 50 drums of oil sludge were emptied into a pit, 40 ft. by 70 ft. in size, located two (2) feet south of Building 881, as shown by an aerial photograph in 1955. The pit appeared to contain oily liquids and seepage was evident. Drainage from the pit appeared to be directed toward a small pond adjacent to Woman Creek. The oil sludge pit was covered after its use, and the pit and seepage are no longer visible on 1959 aerial photographs.

Chemical Burial Site (SWMU 103)

An area south of Building 881 was reportedly used to bury unknown chemicals, but the exact location, dates of use, and contents of the site are unknown. The original location was thought to be the same as the Oil Sludge Pit Site; however, a 50 ft. circular pit, apparently filled with liquid, is shown about 150 ft. southeast of Building 881 on 1963 aerial photographs.

Liquid Dumping Site (SWMU 104)

An area east of Building 881 was reportedly used for disposal of unknown liquids and empty drums before 1969. After further review of historical photographs, a 50 ft. by 50 ft. area, appearing on 1965 aerial photographs, may simply have been a shadow. the Liquid Dumping Pit Site may be the same location as the Chemical Burial Site. This will be verified through additional investigation.

Out-of-service Fuel Tank Sites (SWMU 105.1 and 105.2)

Two (2) out-of-service oil tanks are located immediately south of Building 881. Asbestos was placed in the tanks, which were later filled with concrete. The exact dates of these activities are unknown.

Outfall Site (SWMU 106)

A 6-inch vitrified clay pipe outfall, south of Building 881, discharged water in December 1977. Previous reports indicated that this was a cleanout pipe for an overflow line from the Building 881 cooling tower, but construction drawings indicate that the pipe is an overflow line from the sanitary sewer sump in Building 887.

Hillside Oil Leak site (SWMU 107)

An oil leak was discovered on the hillside south of Building 881 in May 1973. The source of the oil is believed to be the two (2) fuel oil tanks south of the building, but pressure testing of the tanks and associated lines did not reveal any leaks. The oil spill was contained with straw, and the straw and soil were removed and placed in the present landfill north of the Plant. It was later discovered that the oil had emerged through the Building 881 footing drain outfall. A ditch and concrete skimming pond were built below the footing drain outfall to contain the oil. These structures are still present, although no oil has been observed in the outfall since 1973.

#### Multiple Solvent Spill Sites (SWMU 119.1 and 119.2)

Two areas east of Building 881, along the southern perimeter road, were used as storage areas for barrels which contained unknown quantities and types of solvents and wastes. The site boundaries shown on Figure 1-1 represent the extent of soil disturbance associated with the sites. Barrel storage in these areas was discontinued, and all barrels were removed by 1972.

#### Radioactive Site - 800 Area #1 (SWMU 130)

An area east of Building 881 was used between 1969 and 1972 to dispose of Plutonium (Pu)-contaminated soil and asphalt. The materials deposited at this site came from three sources: Pu-contaminated soil and asphalt from the 1969 fire in Building 776, a section of Central Avenue contaminated by a leaking drum in 1968, and Pu-contaminated soil from the vicinity of Building 774 process waste tanks in 1972. Material from the 1969 fire was buried under 1 to 2 ft of fill dirt, the contaminated soil from the third source was placed on top of previously deposited soils and covered with approximately 3 ft of fill dirt.

#### Sanitary Waste Line Leak Site (SWMU 145)

A 4-in, cement-asbestos sanitary sewer line, located south of Building 881, leaked in January 1981. An earthen dike was constructed to prevent the spill from entering the South Interceptor Ditch, and the line was repaired. The line conveyed sanitary wastes to the sanitary treatment plant and did not carry hazardous or radioactive materials. Conveyance of laundry wastewater, which may have contained low levels of radioactive materials, was discontinued in 1973. Review of Building 881 construction drawings indicates that the only sanitary waste lines, presently located south of the building, are the 6-in overflow line from Building 887 and an 8-in vitrified clay pipe which runs east-west into Building 887.

#### Building 885 Drum Storage Site (SWMU 177)

Building 885, immediately south of Building 881, is currently used for satellite collection and 90-day accumulation of RCRA regulated wastes. The building will be closed under RCRA Interim Status (40 CFR 265). Complete information on this solid waste management unit is provided in the RCRA Interim Status Closure Plan, which is appended to the revised Post-Closure Care Permit Application for hazardous and radioactive mixed wastes at the Rocky Flats Plant. Any groundwater contamination from this site will be addressed by the remedial action for Operable Unit No. 1 [2].

#### **1.5 References**

- [1] Department of Energy. 1989. Environmental Assessment for 881 Hillside (High Priority Sites), Interim Remedial Action, November 30, 1989 Draft Version, DOE/ERA 0413
- [2] Department of Energy. 1990. Draft Phase iii RI/FS Work Plan - 881 Hillside Area, Rocky Flats Plant, Golden, Colorado. February, 1990.

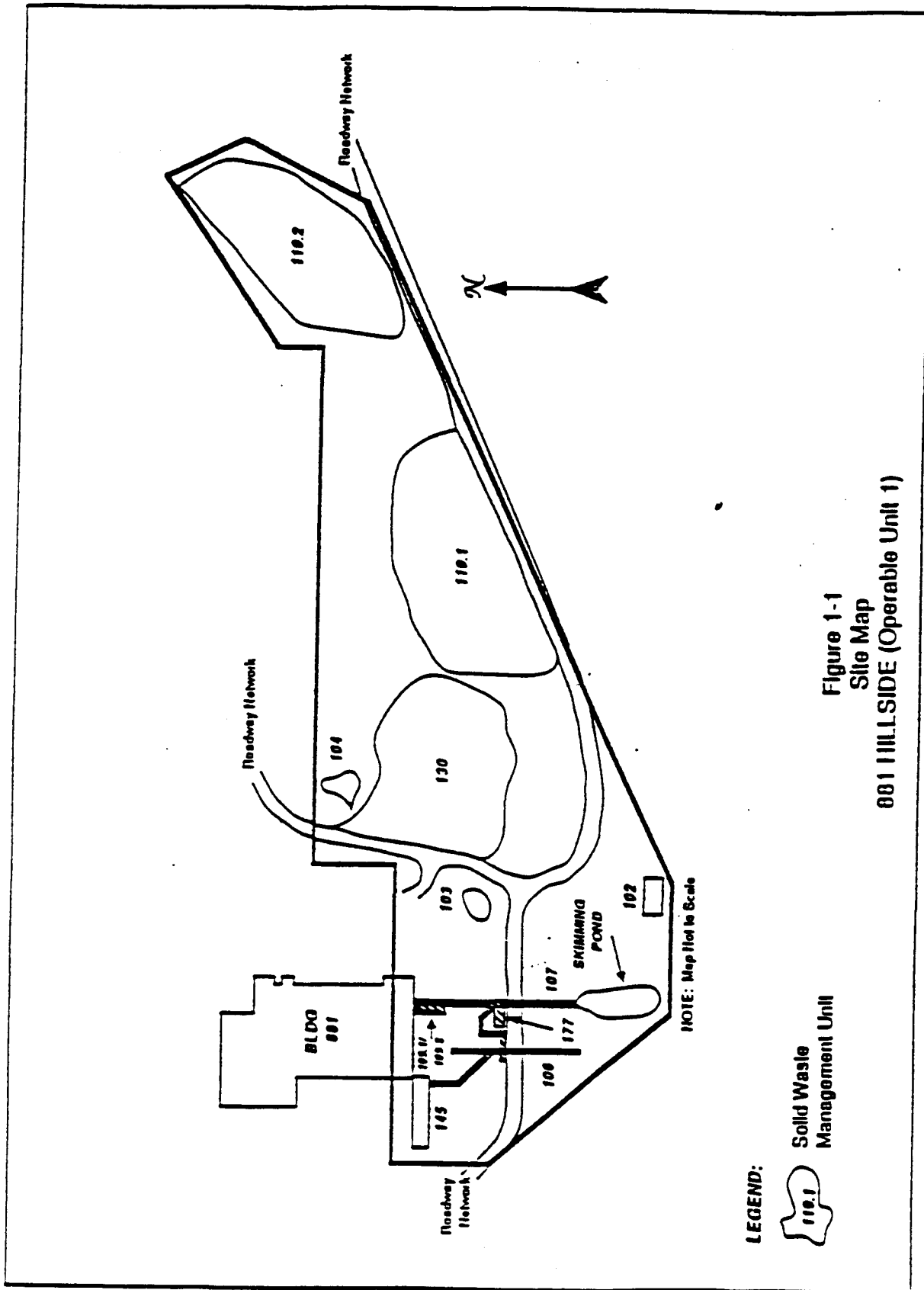


Figure 1-1  
Site Map  
881 HILLSIDE (Operable Unit 1)

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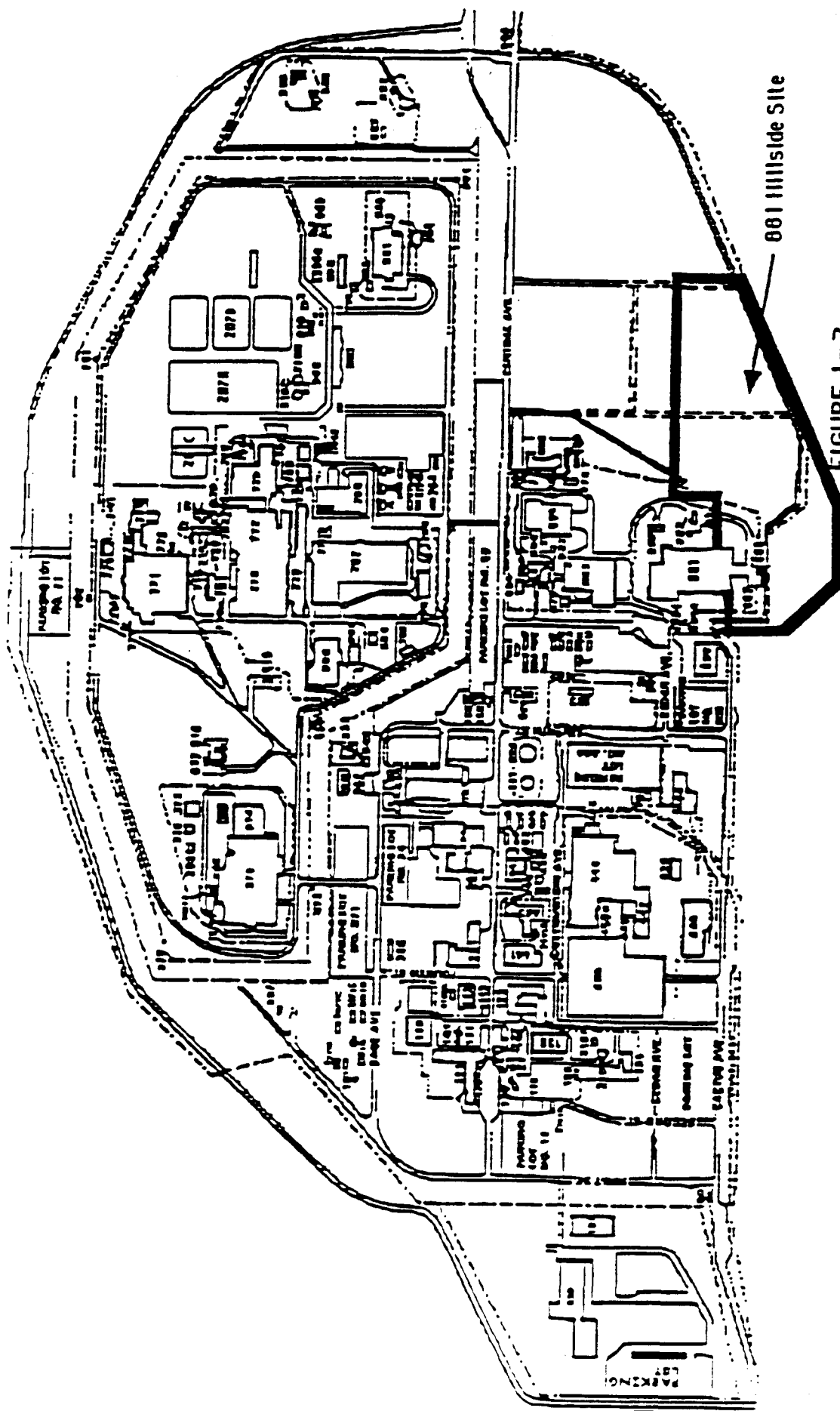


FIGURE 1-2  
881 HILLSIDE  
AREA PLOT PLAN

1 NORTH

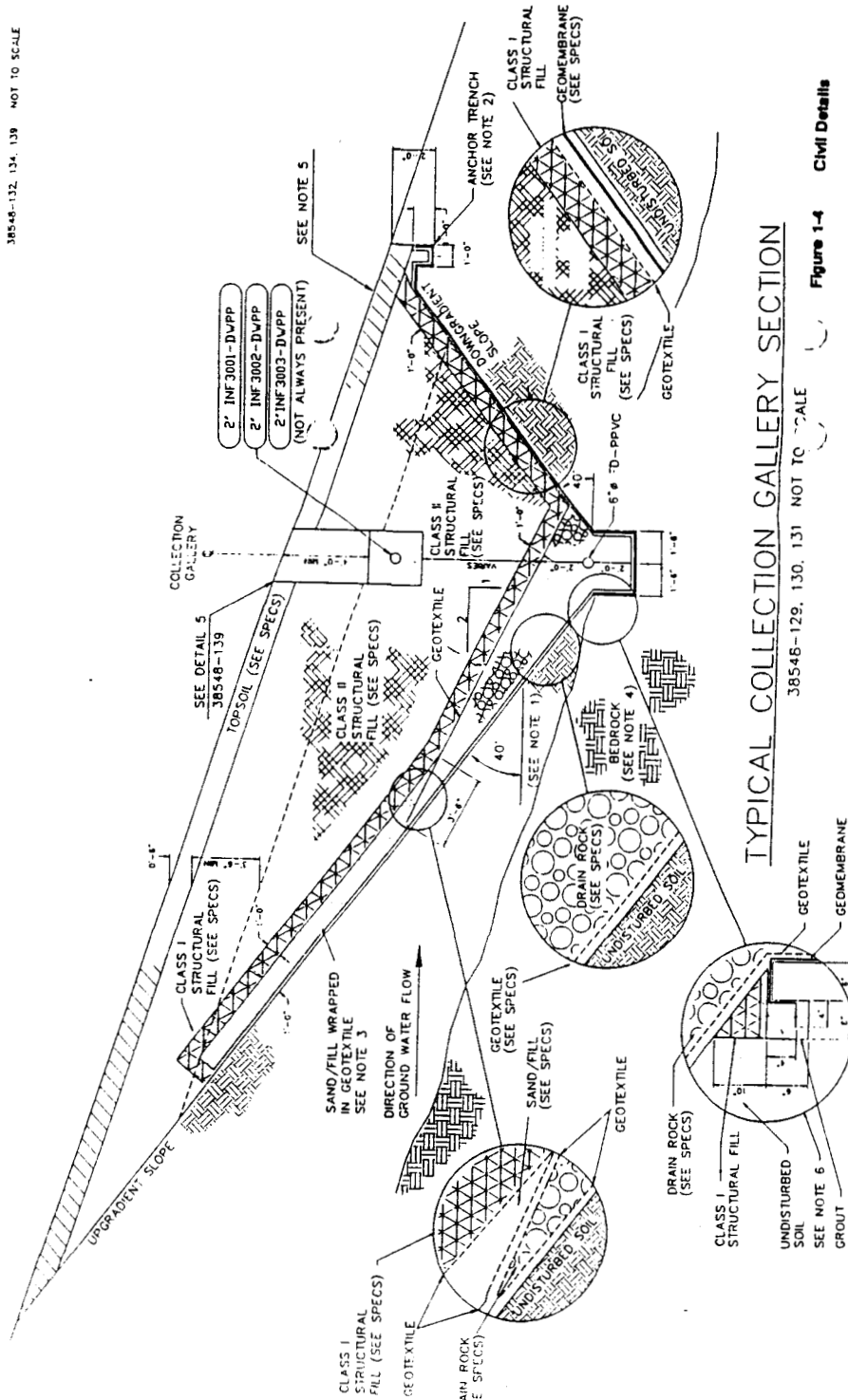


DETAIL 1  
PIPE PENETRATION  
IN GEOTEXTILE

38548-132, 134, 139 NOT TO SCALE

DETAIL 2  
PIPE PENETRATION  
IN GEOMEMBRANE

38548-131, 133 NOT TO SCALE



TYPICAL COLLECTION GALLERY SECTION

38548-129, 130, 131 NOT TO SCALE

Figure 1-4 Civil Details

- NOTES
1. THE CONTRACTOR SHALL CONSTRUCT THE COLLECTION GALLERY SO AS TO MINIMIZE THE AMOUNT OF EXCAVATION REQUIRED. IN THE EVENT OF THE TRENCH, THE CONTRACTOR MAY INCREASE THE SLOPE ANGLE OF THE EXCAVATION, PROVIDED THAT THE EXCAVATION CAN BE PROTECTED WITHOUT ENDANGERING THE WORK.
  2. ANCHOR TRENCH IS LOCATED TWO FEET BELOW THE LOCATION WHERE THE DOWN SLOPE INTERSECTS EXISTING SURFACE TOPOGRAPHY.
  3. AT LEAST THREE FEET OF STRUCTURAL FILL AND ONE FOOT OF TOPSOIL SHALL BE PLACED ABOVE TOP OF SAND/FILL.
  4. TOP OF IMPERMEABLE (CLAYSTONE) BEDROCK MAY BE HIGHER THAN SHOWN.
  5. FINISHED GRADE SHALL BE RESTORED TO PRE-CONSTRUCTION TOPOGRAPHY.
  6. END 1'-4" STRIP OF GEOMEMBRANE SHALL BE ADJACENT WITH CLASS I STRUCTURAL FILL AS SHOWN PRIOR TO INSTALLATION OF ANCHOR TRENCH AND DRAIN ROCK.

ORIGINAL ISSUE		DATE	BY	APP'D	REV	DESCRIPTION
1	1	10/1/88	ES			ISSUED FOR PERMIT
2	1	10/1/88	ES			ISSUED FOR PERMIT
3	1	10/1/88	ES			ISSUED FOR PERMIT
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98	1	10/1/88	ES			ISSUED FOR PERMIT
99	1	10/1/88	ES			ISSUED FOR PERMIT
100	1	10/1/88	ES			ISSUED FOR PERMIT

C COMPUTER GENERATED DRAWING NO MANUAL CHANGES ALLOWED

ENGINEERING-SCIENCE, INC.  
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DENVER, CO 80202



## **2.0 HEALTH AND SAFETY RESPONSIBILITIES**

WESTON shall be directly responsible for the health and safety of its employees. The general organization of health and safety shall consist of a network of EG&G professionals and WESTON.

### **2.1 EG&G Project Manager (As described in EG&G SHERP)**

The EG&G Project Manager (PM) for the 881 Hillside has overall responsibility for the management of the project. The PM is responsible for preparing plans and procedures; implementing the 881 Hillside Health & Safety Program; directing, controlling and reporting project activities; maintaining construction and health and safety documents; and communicating project requirements, including any modifications of the project scope, to the support organizations. The PM will also measure project progress, monitor the budget, evaluate project performance, ensure compliance with health and safety regulations and procedures, serve as a liaison with DOE/RFO (Department of Energy/Rocky Flats Office), EPA and CDH, and has stop work authority. The EG&G Project Manager reports directly to the EG&G Department Manager.

### **2.2 EG&G Health and Safety Officer (As described in EG&G SHERP)**

The EG&G Health and Safety Officer (EG&G HSO) has responsibility for assisting the Project Manager in implementing the EG&G Health and Safety Program. Specific responsibilities include:

- ensuring that a Site-Specific Health and Safety Plan is written for each Operable Unit;
- ensuring that subcontractors submit site or task-specific health and safety plans for approval
- ensuring that a Site Health and Safety Officer is assigned to each Operable Unit; and
- ensuring that adequate safety support and review procedures are established so that site personnel are not at risk while working at the site.

In situations of noncompliance with health and safety requirements, the EG&G HSO will consult with the project manager and initiate corrective actions through his authority. The EG&G HSO is assisted in his duties by the Health and Safety Liaison Officer.

### **2.3 EG&G Health and Safety Liaison Officer (As described in EG&G SHERP)**

The H&S Liaison Officer serves as the central point-of contact for supporting EG&G Projects with operational health and safety needs. The H&S Liaison Officer interacts with the EG&G Project Manager and the EG&G HSO. The H&S Liaison Officer has the following responsibilities:

- assisting project management
- preparing EG&G Operable Unit Health and Safety Plans
- appointing and supervising the Site Health and Safety Coordinator
- performing periodic audits of the implementation of the site health and safety program and program documentation requirements

### **2.4 Task Project Manager**

The WESTON Project Manager for the 881 Hillside 11B task shall consult with the Project Industrial Hygienist to ensure health and safety. His collective responsibilities include the supervision of project personnel, management of activities per EG&G specifications, project budgeting, and scheduling, coordination of health and safety services, and implementation of this HASP.

### **2.5 Project Industrial Hygienist**

The WESTON Project Industrial Hygienist (IH) is responsible for the initial development of this HASP and subsequent addendum based on project dynamics. He will provide continued technical support to the Project Manager and Health and Safety Officer with regard to the implementation of industrial hygiene and radiation safety issues. He is also responsible for the technical accuracy and professional judgement of the health and safety officer.

### **2.6 WESTON Site Health and Safety Coordinator (SHSC)**

The WESTON SHSC shall be responsible for the implementation of this HASP. He or she shall conduct the following duties:

- ensuring that WESTON personnel are adequately trained so that they can perform their assigned tasks safely.
- ensuring that WESTON personnel are aware of potential site hazards, and that they know the necessary controls to prevent overexposure or injury.
- ensuring that the Health and Safety Plans and the required training and medical records for site personnel are current and are maintained on site.
- conducting the required monitoring or assuring that monitoring is conducted by the assigned personnel.

### **2.7 Medical Consultant**

WESTON retains the services of physicians trained in Occupational Medicine through a medical consulting firm. The medical consultant will provide professional recommendations and certifications as required by WESTON to maintain its medical monitoring programs in compliance with 29 CFR 1910.120.

### **3.0 TRAINING**

Personnel assigned to the 881 Hillside must complete the health and safety training required by OSHA and a site specific training course. The 881 Hillside is an Interim Response Action which is classified as a hazardous waste operation by the OSHA standard (29 CFR 1910.120 (a) (1)); therefore, the training requirements, including the initial health and safety training, annual update, and supervisor training, apply at the site. Additional training courses required by EG&G include hazard communication, radiation worker, and respirator training.

#### **3.1 Training Requirements and Course Content**

WESTON shall be responsible for providing their employees with all the training required in this section with the exception of "Radiation Worker Training", which will be provided by EG&G.

##### **3.1.1 Hazardous Waste Site Health and Safety**

Any WESTON employee or subcontractor who is assigned to work within the 881 Hillside exclusion zones must complete the hazardous waste health and safety course required by OSHA in 29 CFR 1910.120(e). The length of the required course is 40 hours. Those workers limited to tasks where there is no potential for exposure to hazardous materials need not have this training.

All hazardous waste workers must complete an eight-hour refresher course annually. The course content is a summary of the 40-hour course.

Supervisors of hazardous waste sites or of tasks conducted on hazardous waste sites must complete, as a minimum, the same baseline training (40 hours) as the workers they supervise and an additional 8-hour supervisor health and safety course.

##### **3.1.2 Radiation Worker Training**

EG&G shall provide a basic 8-hour radiation safety course to all 881 Hillside workers prior to allowing workers on site. The objective of the course is to familiarize workers with the nature and hazards of ionizing radiation, radiation detection, and radiation control. The course is site specific and serves as orientation to the site and of the health physics support services in place at Rocky Flats. An examination is administered after the course is completed.

##### **3.1.3 Site-Specific Training**

All workers assigned to the 881 Hillside will receive training which introduces the information contained in the Site Health and Safety Plan and includes information on the site-specific RFP. The course is designed to provide enough detail that employees can implement the HASP and safely perform their assigned tasks.

##### **3.1.4 Hazard Communication Training**

WESTON shall conduct a hazard communication training program as part of the site-specific training program. In this program, responsibilities for hazardous material evaluation are assigned and hazard information sources, such as MSDS and the chemical labeling system, are described.

WESTON is responsible for maintaining hazard communication training requirements for materials used within their business activities and notifying the IH through the Construction Coordinator of any hazardous chemicals to be brought on site. EG&G staff will inform subcontractors of any hazardous chemicals that may be encountered during operations on site. This may include site-specific training in the hazards of materials used or present in the work place when applicable. At minimum, each subcontractor will receive a copy of the Construction Industry OSHA Safety and Health Standards Digest (OSHA 2201), be shown the location of MSDS, and be instructed in the procedures for the disposal of hazardous wastes generated at the facility (HSP 9.07).

### **3.1.5 Safety Meetings**

The SHSC shall conduct weekly safety meetings with the WESTON employees and subcontractor personnel working at the 881 Hillside. The discussion at these meetings may include:

- changes noted in conditions where work is to be performed.
- health and safety considerations and the required PPE for current operations
- any revisions to the HASP
- any new MSDS filed on the ER project work site;
- documented or observed unsafe acts committed at the work site, clarification of the safety requirements violated and methods to prevent future violations

### **3.1.6 Rehearsal of Emergency Response Plan**

OSHA 29 CFR 1910.120 requires rehearsal of the Emergency Response Plans. Such a rehearsal shall be conducted within thirty days of start-up of operations at a hazardous waste site. The EG&G Health and Safety Officer will coordinate and document the rehearsals which will be used to evaluate the effectiveness of the Plan. The RFP will coordinate rehearsals with subcontractors so that all site personnel are prepared to respond to an emergency. Emergency response to a Rocky Flats Plant emergency will be handled according to the Rocky Flats Emergency Response Plan and will apply to all persons on the RFP site.

### **3.1.7 Visitor Briefings**

Visitors who do not have the required OSHA training shall not be allowed to enter the site exclusion zones or contamination reduction zones (CRZ). All visitors to the 881 Hillside shall have an orientation which summarizes the HSP prior to gaining access to the site. The purpose of the briefing is to provide sufficient information on the hazards and control measures at the site to prevent the visitor from violating any controls unknowingly. Visitors shall be escorted by a trained site employee during the entire visit.

All visitors shall provide signature verification that they have read, understand, and will comply with the requirements of the HASP. Signatures are recorded in a log book and maintained by the project manager at the site.

**3.2****Verification of Training**

WESTON will maintain documentation of the completed required training for all WESTON personnel and subcontractors working at the site. Site employees will also provide signature verification that they have read, understood, and will comply with the 881 Hillside HASP. These records will be kept on file by the SHSC.

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#### 4.0

#### HAZARD ASSESSMENT

The 881 Hillside 11B remediation task involves low to moderate safety risks associated with conventional trenching and excavation. It also involves a risk of low exposure to toxic chemicals and radioactive materials. This section addresses the principal physical and chemical exposures anticipated in the task.

The hazard assessment portion of this HASP includes all the information of section 3.0 of the EG&G 881 Hillside Health and Safety Plan. Figures 1-1 and 1-3 of Section 1 further depict the location of trenching and excavation may be expected to intercept SWMU numbers 103, 119.1, 105, 107 and 130. In addition, contaminated ground water may be encountered in the bottom of the collection gallery, well, and sump. The nature of the contaminants in the SWMUs and in the ground water and associated hazards are described in the sections that follow.

#### 4.1

#### Chemical Contaminant Background Characterization (from the EG&G 881 Hillside Health and Safety Plan)

Potential chemical and radiological hazards that may be encountered during environmental restoration activities on 881 Hillside Area sites were identified by reviewing documents prepared during various phases of Remedial Investigation of the area. These documents provided information of the 881 Hillside site characterization and identified chemical and radiological contaminants in soils, ground water, and surface water. Results of plant-wide air monitoring data was also included in these documents. Site characterization has been a continuous process designed to provide detail with respect to contaminant distribution and concentrations. Sources of contamination throughout the 881 Hillside Area are diverse, therefore, different levels of potential chemical or radiological hazards are expected for individual areas of the Hillside. Direct hazards, such as physical stresses, mechanical and other hazards, were assessed by reviewing documents that discussed preferred action alternatives, and anticipating the types of activities that might be involved in site restoration.

#### 4.2

#### Chemical Contaminant Background Characterization

Soil contamination was determined by comparing site-specific sample data to a historic plant-wide study which determined typical background tolerance levels at the RFP [1]. Materials unique to the 881 Hillside are also considered contaminants since similar compounds were not identified in background studies.

Surface water and ground water contamination was determined by two methods: 1) by comparing sample data to Applicable or Relevant and Appropriate Requirements (ARARs) developed from State and Federal regulations (as required by the Comprehensive Environmental Response Compensation and Liability Act) (CERCLA) and the Superfund Amendments and Re-authorization Act of 1986 (SARA) and 2) review of other health affect assessments, chemical advisories, and guidance documents on materials "to be considered" although not covered by ARARs. These other identified materials are referred to as To Be Considered (TBCs) in this text and accompanying tables.

Contaminants covered by this HASP were the materials identified in soil samples obtained from shallow boreholes with concentrations that exceed background levels, and materials identified in ground water monitoring wells that exceed ARARs or TBC values. Contaminants of concern are listed in Tables 4-1 and 4-2, borehole sites and monitoring well locations are identified in Figure 4-1. Chemical data sheets for each identified contaminant are included as Appendix 4-1.

#### **4.2.1 Soils**

Soils have been analyzed for metals and volatile organic compounds during previous sampling operations at the site. Volatile organics identified include methylene chloride, acetone, phthalates, tetrachloroethylene, trichloroethylene, and 1,1,1-trichloroethane. Contamination is not extensive in soils; tetrachloroethylene, trichloroethylene, and 1,1,1-trichloroethane are the compounds found at the site in the highest concentrations.

Metal contamination at the 881 Hillside is generally within background levels. Trace metals that occurred above the background limits include antimony, arsenic, barium, cadmium, manganese, and mercury.

#### **4.2.2 Ground Water**

Ground water at the 881 Hillside is present in the alluvium, colluvium, valley fill alluvium, and weathered and unweathered bedrock. Ground water quality is divided into two SWMU groups due to the historic activities conducted at the site. The first SWMU group (represented by surficial and deep bedrock samples) includes the oil sludge pit (SWMU 102), chemical burial site (SWMU 103), out-of-service fuel tank site (SWMU 105.1), out-of service fuel tank site (SWMU 105.20), outfall site (SWMU 106), hillside oil leak site (SWMU 107), sanitary waste line leak site (SWMU 145), and Building 885 drum storage site (SWMU 177). Figure 3-2 shows the location of the SWMUs included with this group. The second SWMU group (represented by unconfined flow system samples) consists of the western-most multiple solvent spill site (SWMU 119.1), the eastern-most multiple solvent spill site (SWMU 119.2) and radioactive site - 800 Area Site #1 (SWMU 130). These SWMUs are identified in Figure 1-1.

##### **4.2.2.1 Surficial and Deep Bedrock Samples**

Ground water quality in the area at the first SWMU group was analyzed from data collected during two sampling programs in 1989. The first samples were collected from ten monitoring wells which were constructed in surficial materials in proximity of, or downgradient from the SWMU sites; the second samples were collected from unweathered bedrock located downgradient of the SWMU group.

Both volatile organic and inorganic contamination are present in the surficial well samples. Volatile organics were detected above the analytical detection limits. Inorganic contaminants include bicarbonate, calcium, chloride, magnesium, manganese, nitrate, selenium, sodium, strontium, sulfate, zinc, and dissolved solids.

The deep bedrock samples indicate that ground water in this SWMU group is not contaminated. No volatile organic contamination was identified and metals contamination was slightly above background levels. Dissolved metals identified include barium, lithium, manganese, nickel, and total dissolved solids.

##### **4.2.2.2 Unconfined Flow System Samples**

Data for the second SWMU group was obtained from thirteen monitoring wells constructed in the unconfined flow system downgradient from the sites (See Figure 4-1).

Data from several wells show organic contaminants including carbon tetrachloride, 1,1-dichloroethane, 1,2-dichloroethane, 1,1-dichloroethylene, 1,1,2-trichloroethane, 1,1,1-trichloroethane, methylene chloride, and trichloroethylene {2}. It appears that volatile organic contamination in the colluvial ground water is limited to the area downgradient of the western-most multiple solvent spill site (SWMU 119.1).

Inorganic analysis of samples from several wells identified levels which significantly exceed the background limits. Materials identified include calcium, chloride, magnesium, nitrate, sodium, sulfate, and total dissolved solids. Metals detected above background limits include aluminum, arsenic, barium, cadmium, chromium, copper, iron, lead, lithium, magnesium, nickel, potassium, selenium, sodium, strontium and zinc.

#### **4.2.3 Surface Water**

Surface water quality was analyzed for volatile organics, inorganics, and radiochemistry during the period of March to June 1989. The data were collected from nine surface water sampling stations located along the South Interceptor Ditch, Woman Creek, and at various seeps and ponds in the 881 Hillside Area.

Volatile organics were detected in samples from the Building 881 foundation drain and the pond formed by ground water seepage. No volatile organics were detected in samples taken from the discharge to the Interceptor Ditch. Inorganics detected include total dissolved solids, nitrate, and sulfate. Metals detected include aluminum, beryllium, cadmium, chromium, copper, mercury, selenium, sodium, and zinc. In Woman Creek, volatile organics were not detected, inorganics were within tolerance interval values, and only zinc was detected at levels greater than background levels.

#### **4.2.4 Sediments**

Bedload sediment samples were collected downgradient of the 881 Hillside Area during the 1989 site characterization study. The sediment sample stations are also hydraulically downgradient of the 903 Pad Area and may also reflect this source. No volatile organic compounds were present above detection limits in sediment samples except for acetone, which was also present in the laboratory blank and not a likely sediment contaminant at this location. Beryllium, silver, and tin concentrations were notably elevated above background levels.

### **4.3 Chemical Hazards**

#### **4.3.1 Pathways and Exposure Routes**

Workers involved on tasks identified in Section 1 may be exposed to chemical hazards through three pathways:

- inhalation exposures to volatile organic chemicals and metal contamination in the vicinity of excavations or soil stockpiles, within excavated trenches or holes, or within the water treatment facility.
- skin exposures, or
- inadvertent ingestion of low-volatility organic chemicals or fugitive dust contaminated with metals.



#### Airborne exposures to volatile organic chemicals

Low levels of volatile organic chemicals were detected in alluvial ground water samples in the vicinity of the proposed french drain while concentrations in soil sample were found not to be significant. Normal construction activities and shallow trenching in unsaturated soils should not release volatile organic chemicals. Methylene chloride and acetone were detected at low levels in ground water, but may have been laboratory contaminants; therefore, workers at the french drain construction site are not likely to be exposed to significant levels of organic compounds released from water seeping into the excavation.

Exposure to organic chemicals around unconfined excavations or soil stockpiles are expected to be minimal, since these sources are unconfined and organic concentrations are low. Soils exposed during drilling of the new source well will be damp and unconfined, therefore, organic chemical vapor inhalation is expected to be well within the allowable limits.

Personnel could be exposed to low concentrations of volatile organics during routine operation and maintenance of the water treatment facility. Normal exposure routes to vapors would be from sampling or maintenance, or from system leaks. Yet, since the process is a closed system, in which the UV/peroxide process destroys rather than concentrates the contaminants, it is not expected that workers would be exposed to volatile organic compounds in the treated water.

#### Skin exposures to low-volatility organic chemicals

Measurable levels of low-volatility organic chemicals have been identified in soil samples at the 881 Hillside area.

## Inadvertent ingestion of contaminants

Workers may be exposed to hazardous chemicals or radioactive materials through inadvertent ingestion of contaminated soil during site restoration activities. Bis-(2-ethylhexyl)phthalate is the only low-volatility organic chemical found in the 881 Hillside Area soil. None of the metals detected poses a carcinogenic risk through the ingestion pathway.

### **4.4 Radiological Contaminant Background Characterization**

#### **4.4.1 Soils**

Plutonium was detected above background levels only in surface soils during a sampling program conducted early in 1990 {7} (see Table 3-3). Data from surface scrape samples taken in 1988 also indicate that there is radionuclide surface contamination in the 881 Hillside Area. The locations where surface scrape samples were obtained are shown on Figure 4-3 and the results of this additional survey are shown in Table 4-4. In this study, the highest plutonium concentration detected was  $4.8 \pm 0.5$  pCi/g (sample 882-3), the highest uranium (U-233 and U-234) concentration detected was  $60 \pm 230$  pCi/g, and the highest uranium - 238 value was  $3000 \pm 300$  pCi/g (sample 881-18).

Plutonium concentrations are typical of surface concentrations in this vicinity and to the east within the Plant boundary {4}. It must be noted that since plutonium is not naturally occurring, any detectable levels of plutonium will be considered sources of contamination. Uranium, cesium, and tritium occur infrequently above background and at depths below the surface. None of these radionuclides were present above background by more than a factor of two above which indicates that the uranium is natural. Cesium-137 is presumed to be due to atmospheric fallout from historic global weapons testing. In summary, radionuclide concentrations may represent natural variations outside the background tolerance intervals {2}.

#### **4.4.2 Groundwater**

Uranium-223, - 234, uranium-235, and uranium-238 were measured above background in groundwater samples taken in the vicinity of the first group of SWMUs.

#### **4.4.3 Surface Water and Sediments**

Uranium was the only radionuclide detected above background in South Interceptor Ditch surface water stations downstream from the 881 Hillside Area. Plutonium was also found in four sediment sample stations.

#### **4.4.4. Air**

The 903 Pad Area, east-northeast of 881 Hillside, is recognized as the principal source of airborne plutonium contamination at the plant. Air samplers for routine ambient air monitoring of radionuclides are situated at 51 locations on and off the plant site. Historically, particulate samplers located immediately east, southeast, and northeast of the 903 Pad, Mound and East Trenches have shown the highest plutonium concentrations. However, the Plant Radioactive Ambient Air Monitoring Program has found ambient air samples to be well within applicable regulations and guidelines for the protection of human health and the environment for all radioactive contaminants {4}.

## **4.5 Radiological Hazards**

### **4.5.1 Pathways and Exposure Routes**

Workers involved in environmental restoration activities and construction and operation of collection and treatment facilities associated with the remedial action at the 881 Hillside Area could be exposed to radiological hazards through inhalation and ingestion pathways. Radioactive materials are not readily absorbed through the skin, so they do not present a risk to workers through contact. Important pathways are:

- external contact with radioactive materials
- inhalation exposure to fugitive dust contaminated with radioactive materials
- inadvertent ingestion of fugitive dust contaminated with radioactive materials

#### Inhalation or ingestion exposure to fugitive dust contaminated with radioactive materials

Workers could be exposed through inhalation or inadvertent ingestion of fugitive dust contaminated with radioactive materials during excavation and construction activities. This may occur if these surface soils were to be disturbed without appropriate precautions during operations performed when weather conditions could cause dust entrapment into the atmosphere.

## **4.6 Summary of Chemical and Radiological Hazards**

The presence of chemical and radiological hazards for each individual SWMU is based on data from characterization surveys. More specific sampling for each SWMU has been proposed in interim remedial action plans. The hazards identified are therefore subject to revision as a result of further surveys.

#### Oil Sludge Pit (SWMU 102)

Isolated detections of tetrachloroethylene were found in the soil gas survey and have been found in soils.

#### Chemical Burial Site (SWMU 103)

Tetrachloroethylene was detected in soil gas and soil samples contained 2-butanone and phthalate.

#### Liquid Dumping Site (SWMU 104)

This site may be the same location as SWMU 103. No evidence of this area was found in review of historical aerial photographs or in field investigations.

Out-of-service Fuel Tanks (SWMU 105.1 and 105.2)

No evidence of contamination has been found near the tanks and they have been removed from consideration as potential sources of contamination.

Sanitary Sewer Outfall (SWMU 106)

Soils in the vicinity were found to contain methylene chloride, acetone, 2-butanone, and phthalates.

Hillside Oil Leak (SWMU 107)

The source of the oil from the Building 881 footing drain was never positively identified. The oil was collected in a skimming pond and transported off site. Tetrachloroethylene, 1,1,1-trichloroethane, trichloroethylene, and dichloroethylene were detected in soil gas in the vicinity.

Multiple Solvent Spill Sites (SWMU 119.1 and 119.2)

Tetrachloroethylene and trichloroethylene were found in soil gas samples. Several volatile organic compounds and phthalates were found in soils near the sites.

Radioactive Site - 800 Area #1 (SWMU 130)

An area east of Building 881 was used between 1969 and 1972 to dispose of Pu-contaminated soil and asphalt. The materials deposited at this site came from three sources: Pu-contaminated soil and asphalt from the 1969 fire in Building 776, a section of Central Avenue contaminated by a leaking drum in 1968, and Pu-contaminated soil from the vicinity of Building 774 process waste tanks in 1972. Material from the 1969 fire was buried under 1 to 2 feet of fill dirt, and the contaminated soil from the third source was placed on top of previously deposited solids and covered with approximately 3 feet of fill dirt. Methylene chloride and bis(2-ethylhexyl)phthalate were found in soil samples.

Sanitary Waste Line Leak (SWMU 145)

The line conveyed sanitary wastes to the sanitary treatment plant and did not carry hazardous or radioactive materials. The site has been removed from consideration.

Building 885 Drum Storage Site (SWMU 177)

Building 885, immediately south of Building 881, is currently used for satellite collection and 90-day accumulation of RCRA regulated wastes. The building will be closed under RCRA Interim Status (Code of Federal Regulations #40, Part 265 (40 CFR 265)). Complete information on this solid waste management unit is provided in the Resource Conservation Recovery Act (RCRA) Interim Status Closure Plan, which is appended to the revised Post-Closure Care Permit Application for hazardous and radioactive mixed wastes at the Rocky Flats Plant. Any ground water contamination from this site will be addressed by the remedial action as stated in the Remedial Action Plan/Environmental Assessment for Operable Unit No.1 [2].

## 4.7 Physical Stresses

Workers on sites within the 881 Hillside Area are potentially subjected to physical stresses including heat and cold stress and noise exposure. Restoration operations may take place during a wide range of weather conditions. Workers using impermeable clothing during warm weather are susceptible to heat stress.

### 4.7.1 Cold Stress

The potential for cold stress is a particular concern when field activities are performed while air temperatures at the site are below 40 degrees F. If winds are blowing at 5 mph or greater and/or the weather is damp or wet, cold stress is even more of a potential hazard. Precautions that will be taken to prevent cold stress include wearing cold-protective clothing appropriate for the level of cold and physical activity, changing clothing if it becomes wet, and establishing a work/warming regimen. Cold-protective clothing will include layering of garments and use of gloves and hats. The warming breaks should be taken in a warm location if at all possible; this can include improvising a wind break shelter at the site. During warming breaks taken in the site support zone, warm, sweet beverages and hot soups should be consumed to provide calories and fluids. Drinking coffee or other caffeinated beverages is not recommended.

Cold stress, if not prevented, can result in frostbite and hypothermia. Ignoring the signs and symptoms can be life-threatening. Prevention is the key. As a preventative measure, body core temperature must not drop below 96.8 degrees F. Pain in the extremities is the first early warning of cold stress. Severe shivering sets in when body core temperature has dropped to 95 degrees F. If this occurs, work will stop immediately and the affected worker(s) will take a warming break of sufficient duration that the cold stress signs and symptoms are gone. Additional signs of cold stress include deterioration of physical coordination, slurred speech, and faulty judgement.

### 4.7.2 Heat Stress

The potential for heat stress is a concern when field activities are performed on warm sunny days, and is accentuated when chemical protective clothing is worn. Heat stress prevention measures and monitoring will be implemented if site temperatures are above 70 degrees Fahrenheit (F). Strenuous activity or unacclimated workers may necessitate initiating heat stress prevention programs at lower temperatures. The SHSC will be responsible for identifying the need to initiate the heat stress prevention program at lower temperatures.

Precautions to prevent heat stress will include work/rest cycles so that rest periods are taken before excessive fatigue occurs, and regular intake of water to replace that lost from perspiration. Work/rest cycles will be based on monitoring the heart rate (pulse) of each individual worker. Rest breaks will be long enough to reduce the heart rate (HR) below levels calculated according to the following method:

1. The worker will initially determine his/her resting HR prior to starting work activities.
2. At the start of the first rest period the worker will determine his/her HR. This initial HR should not exceed the individuals age-adjusted maximum  $HR < \text{which equals } [(0.7) (220 - \text{age in years})]$ . At 1 minute into the rest period the recovery HR will be determined. The recovery HR should not exceed 110 beats per minute.

3. If the initial HR exceed the age-adjusted maximum HR, or the 1-minute recovery HR is greater than 110 beats per minute, then the next work period will be decreased by one third.

Heat stress due to water loss can be prevented. To prevent dehydration water intake must approximate perspiration. Water intake guidelines are as follows.

1. The sense of thirst is not an adequate regulator of water replacement needs during heat exposure. Therefore, water must be replaced at prescribed intervals.
  - a. Before work begins, drink two 8-ounce glasses of water.
  - b. During each rest period, drink at least two 8-ounce glasses of water.
2. Plain water, served cool, is excellent. An adequate supply of potable water

and drinking cups will be readily available, such as in a support vehicle, to provide water during rest periods.

3. Adding salt to water is not recommended. However, other fluids, in addition to water, could include diluted fruit juices and electrolyte replacement drinks diluted 3:1 with water. Do not use salt tablets!

If possible, acclimatize or condition workers to heat by starting out with shorter work periods in the first days of the project and gradually extend work periods. Taking frequent rests in a shaded area can reduce risk from heat stress. Avoid extremes in temperatures such as going into highly air conditioned areas on breaks unless heat stress is suspected. Cooling can reduce acclimatization.

The initial work/rest cycle will be based on the adjusted temperature per (NIOSH) Publication No. 85-115, **Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities**. At any time field team members recognize the signs or symptoms of heat stress prior to a scheduled rest period, they will notify the SHSC immediately in order that a rest period can be called.

Heat stress, if not prevented, may result in heat exhaustion or heat stroke. Heat exhaustion will occur if the prevention measures described above are not implemented. Ignoring the signs and symptoms of heat exhaustion will lead to the development of heat stroke.

Heat stroke is an immediate, life-threatening condition that result because the body's heat regulating mechanisms shut down, and the body cannot cool itself sufficiently. As heat is excessively stored in the body, brain damage can result causing permanent disability or death.

#### **4.7.3**

#### **Noise Exposure**

Workers will be exposed to noise during restoration activities at the 881 Hillside Area from excavation and hauling equipment. Noise exposure shall be controlled to levels below those stipulated in Table 4-5 or adequate hearing protection shall be required for all exposed personnel. The SHSC shall be responsible for compliance with ACGIH recommended levels [6].

**APPENDIX 4-1**

**CHEMICAL DATA SHEETS**



# APPENDIX 4 - 1

881 HILLSIDE

## CHEMICAL DATA SHEET

### ACETONE

SYNONYMS: DIMETHYL KETONE, PROPANONE 2-PROPANONE		HPPA: HEALTH - 1 FLAMMABILITY - 3		REACTIVITY - 0		
CHEMICAL FORMULA: $CH_3COCH_3$		PHYSICAL CHARACTERISTICS:				
CAS NUMBER: 67-64-1		PHYSICAL STATE: WATERY LIQUID				
RCRA WASTE NO.:		COLOR: COLORLESS				
		ODOR: SWEET ODOR				
		ODOR THRESHOLD: 100 ppm				
PHYSICAL PROPERTIES:						
MW: 58.08		VP: 226mm @ 25°C		LEL: 2.6%		
BP: 56.5°C		VO: 2.00		UEL: 12.8%		
MP: -95.3°C		SG: 0.791 @ 20°C		FP: -17.8°C		
SOL: Miscible						
IP: 9.68 ev						
EXPOSURE LIMITS:						
	TWA		STEL		IDLM	
	ppm	mg/m <sup>3</sup>	ppm	mg/m <sup>3</sup>	ppm	mg/m <sup>3</sup>
OSHA PEL:	750	1800	1000	2400	20,000	-
NIOSH REL:	250	590	-	-	-	-
ACGIH TLV:	750	1780	1000	2380	-	-
ROUTES OF EXPOSURE:						
INH, ING, CON			TARGET ORGANS:			
			RESPIRATORY SYSTEM, SKIN			
SYMPTOMS OF EXPOSURE:						
Irritation of eyes, nose, throat, headache, dizziness, dermatitis						

# APPENDIX 4 - 1

881 HILLSIDE

## CHEMICAL DATA SHEET

### ARSENIC

SYNONYMS:		NFPA: HEALTH -		REACTIVITY -	
		FLAMMABILITY -			
CHEMICAL FORMULA: As		PHYSICAL CHARACTERISTICS:			
CAS NUMBER: 7440-38-2		PHYSICAL STATE: Crystalline & amorphous			
RCRA WASTE NO.:		COLOR: Silver - Black			
		ODOR: Garlic			
		ODOR THRESHOLD:			
PHYSICAL PROPERTIES:					
MW: 74.92		VP: 1MM		LEL:	
BP: 612°C		VD:		UEL:	
MP: 814°C		SG:		FP:	
SOL: Insoluble					
IP:					
EXPOSURE LIMITS:					
		TWA		STEL	
		ppm mg/m <sup>3</sup>		ppm mg/m <sup>3</sup>	
OSHA PEL:		- 0.5*-0.01**		- -	
NIOSH REL:		- -		- 0.002	
ACGIH TLV:		- 0.2		- -	
IDLH					
ppm mg/m <sup>3</sup>					
CA					
ACTION LEVELS					
ppm mg/m <sup>3</sup>					
CA					
ROUTES OF EXPOSURE: ING, INH, ABS, CON				TARGET ORGANS: Liver, kidneys, skin, Lungs, lymphatic system	
SYMPTOMS OF EXPOSURE: Carcinogen, peripheral neuropathy, ulceration of nasal septum, GI disturbances, respiratory irritant, hyper pigmentation of skin					

\* organic compounds

\*\* inorganic compounds

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## APPENDIX 4 - 1

881 HILLSIDE

## CHEMICAL DATA SHEET

**CADMIUM**

SYNONYMS:		NFPA: HEALTH -		REACTIVITY - 0	
		FLAMMABILITY - 0			
CHEMICAL FORMULA: Cd		PHYSICAL CHARACTERISTICS:			
CAS NUMBER: 7440-43-9		PHYSICAL STATE: Solid			
		COLOR: Blue-White Metal or Grayish-White Powder			
		ODOR: Odorless			
RCRA WASTE NO.:		ODOR THRESHOLD: NA			
PHYSICAL PROPERTIES:					
MW: 112.41		VP: -0		LEL: NA	
BP: 767 °C		VD: NA		UEL: NA	
MP: 320.9 °C		SG: 8.642		FP: NA	
SOL: Insoluble					
IP: NA					
EXPOSURE LIMITS:					
TWA		STEL		CEIL	
ppm	mg/m <sup>3</sup>	ppm	mg/m <sup>3</sup>	ppm	mg/m <sup>3</sup>
ACTION LEVELS					
ppm	mg/m <sup>3</sup>	ppm	mg/m <sup>3</sup>	ppm	mg/m <sup>3</sup>
OSHA PEL:		0.2		0.6	
NIOSH REL:					
ACGIH TLV:				0.05	
ROUTES OF EXPOSURE:					
INH, ING		TARGET ORGANS:			
		Respiratory System, Lungs, Kidney, Prostate, Blood			
SYMPTOMS OF EXPOSURE: Nose and throat irritation, delayed cough, chest pain, sweating, chills, shortness of breath, weakness, death; ingestion causes nausea, vomiting, diarrhea and abdominal cramps; long-term exposure may cause loss of sense of smell, ulceration of nose, emphysema, kidney damage, mild anemia prostate cancer					

# APPENDIX 4 - 1

881 HILLSIDE

## CHEMICAL DATA SHEET

### CARBON TETRACHLORIDE

SYNONYMS: Tetrachloromethane, Perchloromethane, carbon tet		MFPA: HEALTH - 3 FLAMMABILITY - 0		REACTIVITY - 0	
CHEMICAL FORMULA: CCl <sub>4</sub> CAS NUMBER: 56-23-5 RCRA WASTE NO.:		PHYSICAL CHARACTERISTICS: PHYSICAL STATE: Liquid COLOR: Colorless ODOR: Sweet, Aromatic, Ether-like ODOR THRESHOLD: >10 ppm			
PHYSICAL PROPERTIES:					
MW: 153.8 BP: 76.8 °C MP: -23 °C		VP: 91 mmHg (20°C) VO: 5.3 SG: 1.59		LEL: NA UEL: NA FP: NA	
		SOL: 0.08 % IP:			
EXPOSURE LIMITS:					
TWA		STEL		CEIL	
ppm mg/m <sup>3</sup>		ppm mg/m <sup>3</sup>		ppm mg/m <sup>3</sup>	
IDLH		ACTION LEVELS			
ppm mg/m <sup>3</sup>		ppm mg/m <sup>3</sup>		ppm mg/m <sup>3</sup>	
OSHA PEL:		2 12.6		-	
NIOSH REL:		2* 12.6*		-	
ACGIH TLV:		5 31 (skin)		-	
ROUTES OF EXPOSURE:					
INH, ING, ABS, CON		TARGET ORGANS: CNS, Eyes, Lungs, Liver, Kidneys, Skin			
SYMPTOMS OF EXPOSURE: Drowsiness; dizziness; incoordination; nausea; vomiting; CNS depression; unconsciousness; skin/eye irritation/burning; heart, liver, kidney damage					

\* 60 min

## APPENDIX 4 - 1

881 HILLSIDE

## CHEMICAL DATA SHEET

**MANGANESE**

SYNONYMS:		NFPA: HEALTH -		REACTIVITY -	
		FLAMMABILITY -			
CHEMICAL FORMULA: Mn		PHYSICAL CHARACTERISTICS:			
CAS NUMBER: 7439-96-5		PHYSICAL STATE: BRITTLE			
RCRA WASTE NO.:		COLOR: REDDISH-GRAY, silver			
		ODOR:			
		ODOR THRESHOLD:			
PHYSICAL PROPERTIES:					
MW: 55	VP: 1MM	LEL:	SOL:		
BP: 2097°C	VD:	UEL:	IP:		
MP: 1245°C	SG: 7.2	FP:			
EXPOSURE LIMITS:					
TWA ppm mg/m <sup>3</sup>		STEL ppm mg/m <sup>3</sup>	CEIL ppm mg/m <sup>3</sup>	IDLH ppm mg/m <sup>3</sup>	ACTION LEVELS ppm mg/m <sup>3</sup>
OSHA PEL:		5			
NIOSH REL:					
ACGIH TLV:		5			
ROUTES OF EXPOSURE:			TARGET ORGANS:		
Inh, Ing			Resp. sys, CNS, blood, kidneys		
SYMPTOMS OF EXPOSURE: Parkinsons, asthenia, insomnia, neurological symptoms, fever, dry throat, cough, tight chest, dyspnea; low back pain; vomiting					

## APPENDIX 4 - 1

881 HILLSIDE

## CHEMICAL DATA SHEET

**MERCURY**

SYNONYMS: QUICK SILVER		NFPA: HEALTH - FLAMMABILITY -		REACTIVITY - NON COMUSTABLE	
CHEMICAL FORMULA: Hg		PHYSICAL CHARACTERISTICS:			
CAS NUMBER: 7439-97-6		PHYSICAL STATE: Liquid			
RCRA WASTE NO.:		COLOR: Silver			
		ODOR: Odorless			
		ODOR THRESHOLD:			
PHYSICAL PROPERTIES:					
MW:		VP: 2710 <sub>3</sub> MM		LEL:	
BP: 357°C		VO:		UEL:	
MP: -39°C		SG: 13.5		FP:	
SOL: 0.002%					
IP:					
EXPOSURE LIMITS:					
		TWA		STEL	
		ppm mg/m <sup>3</sup>		ppm mg/m <sup>3</sup>	
				CEIL	
				ppm mg/m <sup>3</sup>	
				IDLH	
				ppm mg/m <sup>3</sup>	
				ACTION LEVELS	
				ppm mg/m <sup>3</sup>	
OSHA PEL:		0.05(skin)			
NIOSH REL:		0.05		28	
ACGIH TLV:		0.05(skin)		0.3	
ROUTES OF EXPOSURE:					
INH, ABS, CON		TARGET ORGANS: systemic: respiratory system, CNS, skin, GI tract			
SYMPTOMS OF EXPOSURE: Acute: headaches, cough, dyspnea, soreness of mouth, loss of teeth, nausea, diarrhea; Chronic: tremors in hands, eyelids, lips, tongue or jaw; skin rash, headaches, neurological symptoms.					

## APPENDIX 4 - 1

881 HILLSIDE

## CHEMICAL DATA SHEET

## METHYLENE CHLORIDE

SYNONYMS: Methylene Dichloride Dichloromethane		NFPA: HEALTH - 2 FLAMMABILITY - 0		REACTIVITY - 1	
CHEMICAL FORMULA: CH <sub>2</sub> Cl <sub>2</sub>		PHYSICAL CHARACTERISTICS:			
CAS NUMBER: 75-09-2		PHYSICAL STATE: Liquid			
RCRA WASTE NO.:		COLOR: Colorless			
		ODOR: Pleasant, Aromatic			
		ODOR THRESHOLD: 205-307 ppm			
PHYSICAL PROPERTIES:					
MW: 85		VP: 350 mm Hg		LEL: 12%	
BP: 104°F		VD: 2.93		UEL: 19%	
MP: -142°F		SG: 1.33		FP: NA	
				SOL: 1.3%	
				IP: 11.35 ev	
EXPOSURE LIMITS:					
TWA		STEL		CEIL	
ppm mg/m <sup>3</sup>		ppm mg/m <sup>3</sup>		ppm mg/m <sup>3</sup>	
OSHA PEL: 500(T) -		2000(T) -		1000(T) -	
NIOSH REL:					
ACGIH TLV: 50 174		- -		- -	
ROUTES OF EXPOSURE:					
INH, ING, CON		TARGET ORGANS:			
		Skin, CVS, Eyes, CNS			
SYMPTOMS OF EXPOSURE:					
Light headedness; Mental Confusion; Weakness; Fatigue; Nausea; Vomiting;					
Headache; Loss of Consciousness; Skin, Eye Irritation.					



## APPENDIX 4 - 1

881 HILLSIDE

## CHEMICAL DATA SHEET

## SILICA (CRYSTALLINE QUARTZ)

SYNONYMS: Quartz, cristobalite, tridymite		NFPA: HEALTH -		REACTIVITY -	
		FLAMMABILITY -			
CHEMICAL FORMULA: SiO <sub>2</sub>		PHYSICAL CHARACTERISTICS:			
CAS NUMBER: 14808-60-7		PHYSICAL STATE:			
RCRA WASTE NO.:		COLOR: colorless			
		ODOR: odorless			
		ODOR THRESHOLD:			
PHYSICAL PROPERTIES:					
MW: 60		VP: - 0mm		LEL:	
BP: 4046°		VO:		UEL:	
MP: 2912°		SG:		FP:	
SOL: insoluble					
IP:					
EXPOSURE LIMITS:					
TWA		STEL		CEIL	
ppm	mg/m <sup>3</sup>	ppm	mg/m <sup>3</sup>	ppm	mg/m <sup>3</sup>
IDLH	ACTION LEVELS				
ppm	mg/m <sup>3</sup>				
OSHA PEL:	0.1*				
NIOSH REL:	0.05*				
ACGIH TLV:	0.1*				
ROUTES OF EXPOSURE: INH			TARGET ORGANS: Respiratory system		
SYMPTOMS OF EXPOSURE: Coughing, dyspnea, wheezing, impaired pulmonary function, progressive symptoms.					

\*Respirable dust

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## APPENDIX 4 - 1

881 HILLSIDE

## CHEMICAL DATA SHEET

**1,1,2,2-TETRACHLOROETHANE**

SYNONYMS: acetylene tetrachloride, Tetrachloroethane, ethane tetrachloride		NFPA: HEALTH - FLAMMABILITY -		REACTIVITY - 0	
CHEMICAL FORMULA: CCl <sub>2</sub> CCl <sub>2</sub>		PHYSICAL CHARACTERISTICS:			
CAS NUMBER: 79-34-5		PHYSICAL STATE: Liquid or Solid			
RCRA WASTE NO.:		COLOR: Colorless, Yellowish Green			
		ODOR: Slight Ether Like Odor			
		ODOR THRESHOLD:			
PHYSICAL PROPERTIES:					
MW: 168		VP: 8mm Hg		LEL: NA	
BP: 146°C		VD: 5.8		VEL: NA	
MP: -42.5°C		SG: 1.6		SOL: .29%	
				IP: 11.1	
EXPOSURE LIMITS:					
	TWA		STEL		ACTION LEVELS
	ppm	mg/m <sup>3</sup>	ppm	mg/m <sup>3</sup>	
OSHA PEL:	1	7(skin)	-	-	CA
NIOSH REL:					
ACGIH TLV:	1	6.9(skin)	-	-	
ROUTES OF EXPOSURE:					
INH, ABS, ING, CON			TARGET ORGANS:		
			Liver, Kidneys, CNS		
SYMPTOMS OF EXPOSURE: Acute - Eye, Nose Irritation; Nausea, Vomiting, Drowsiness; Kidney, Liver Damage, Severe Exposures - Skin may turn deep dusky color within a few hours, Unconsciousness, Death; Chronic Fatigue, Loss of appetite, Tremors, Weight loss.					

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# APPENDIX 4 - 1

881 HILLSIDE

## CHEMICAL DATA SHEET

### TOLUENE

SYNONYMS: Toluol, methylbenzene, methylbenzol, phenylmethane				NFPA: HEALTH - 2 REACTIVITY - 0 FLAMMABILITY - 3				
CHEMICAL FORMULA: C6 H5 CH3				PHYSICAL CHARACTERISTICS:				
CAS NUMBER: 108-88-3				PHYSICAL STATE: liquid				
RCRA WASTE NO.:				COLOR: colorless				
				ODOR:				
				ODOR THRESHOLD:				
PHYSICAL PROPERTIES:								
MW: 92		VP: 22mm		LEL: 1.27				
BP: 111°C		VO: 3.14		UEL: 7.1				
MP: -95°C		SG: 0.86		IP: 8.82				
FP: 4°								
EXPOSURE LIMITS:								
	TWA		STEL		CEIL	IDLM	ACTION LEVELS	
	ppm	mg/m <sup>3</sup>	ppm	mg/m <sup>3</sup>	ppm	mg/m <sup>3</sup>	ppm	mg/m <sup>3</sup>
OSHA PEL:	100	375	150	560				
NIOSH REL:	100	375	200	750				
ACGIH TLV:	100	377	150	565		2000		
ROUTES OF EXPOSURE: INH, ABS, ING, CON						TARGET ORGANS: Eyes, respiratory track, skin		
SYMPTOMS OF EXPOSURE: Acute: eye, respiratory and skin irritation; fatigue, weakness, confusion, headache, dizziness and drowsiness; numbness, unconsciousness or death; inhalation may cause difficulty seeing in bright light. Chronic: drying or cracking of skin.								

## APPENDIX 4 - 1

881 HILLSIDE

## CHEMICAL DATA SHEET

**1,1,1 - TRICHLOROETHANE**

SYNONYMS: methyl chloroform, 1,1,1-TCE		NFPA: HEALTH - FLAMMABILITY -		REACTIVITY -				
CHEMICAL FORMULA: C <sub>2</sub> H <sub>3</sub> Cl <sub>3</sub>		PHYSICAL CHARACTERISTICS:						
CAS NUMBER: 71-55-6		PHYSICAL STATE: Liquid						
RCRA WASTE NO.: U226		COLOR: Colorless						
		ODOR: Pleasant Odor						
		ODOR THRESHOLD:						
PHYSICAL PROPERTIES:								
MW:		VP: 40mm		LEL:	SOL:			
BP: 114°		VO:		UEL:	IP:			
MP:		SG:		FP: -35°				
EXPOSURE LIMITS:								
	TWA		STEL			IDLH	ACTION LEVELS	
	ppm	mg/m <sup>3</sup>	ppm	mg/m <sup>3</sup>	ppm	mg/m <sup>3</sup>	ppm	mg/m <sup>3</sup>
OSHA PEL:	350	1900	450	2450				
NIOSH REL:	-	-	-	-	350	1910		
ACGIH TLV:	350	1910	450	2460				
ROUTES OF EXPOSURE: INH, ING, CON Intravenous & Subcutaneous				TARGET ORGANS: Eyes, nose, lungs, liver, kidneys				
SYMPTOMS OF EXPOSURE: Irritation of eyes, mucous membranes, skin irritation								

Table 4-1												
VOLATILE ORGANIC COMPOUNDS DETECTED IN UNCONFINED GROUND WATER - 2ND QTR 1989												
Reference [2]	Compound also present in Blank	U - Estimated Value	Well	Quarter	Carbon Tetrachloride (ug/l)	Trichloroethene (ug/l)	Trichloroethane (ug/l)	1,1-Dichloroethene (ug/l)	1,1-Dichloroethane (ug/l)	1,1-Dichloroethane (ug/l)	1,2-Dichloroethane (ug/l)	1,1,2,2-Tetrachloroethane (ug/l)
Material	Rocky Falls	Aluminum	01 87	1 - Dry								
			51 87	2 - Dry								
			52 87	1 - Dry								
				2 - Dry								
			09 74	1		780E	7900					
				2		2800J	8500J					
			10 74	1	660EU	2J	410EU					
				2	2400J	17J	1200J					
			63 86	1 - Dry								
				2 - Dry								
			68 86	1								
				2								
			02 87	1			35J					
				2								
			04 87	1	11J	5J	89					
				2		6J	110J					
			06 87	1 - Dry								
				2								
			43 87	1		3400J	11000					
				2		5800J	8500J					
			44 87	1 - Dry								
				2 - Dry								
			47 87	1 - Dry								
				2 - Dry								
			48 87	1 - Dry								
				2 - Dry								
			49 87	1 - Dry								
				2 - Dry								
			50 87	1 - Dry								
				2 - Dry								
			53 87	1 - Dry								
				2 - Dry								
			54 87	1 - Dry								
				2 - Dry								

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Table 4-2

**CHEMICAL SPECIFIC ARARs FOR COMPOUNDS  
AND ELEMENTS DETECTED AT THE 801 HILLSIDE AREA\***

Chemical Metals (Cont.)	Maximum In 801 Hillside Area Alluvial Ground Water(a)	ARAR (µg/l)	Detection Limit (mg/l)	Standard Criteria or Guidance	Comment
Chromium VI	0.0782	0.05	0.01	CDII Surface Water; Drinking Water Standard is applicable	ARAR is exceeded
Copper	0.9515	0.2	0.025	CDII Surface Water; Drinking Water Standard is applicable	ARAR is exceeded
Iron	0.4085	0.3	0.1	CDII Surface Water; Drinking Water Standard is applicable	Analytical results are total soluble iron; soluble iron exceeds ARAR
Manganese	0.9586	0.05	0.015	CDII Surface Water; Drinking Water Standard is applicable	Analytical results are total soluble manganese; soluble manganese exceeds ARAR
Mercury	0.9	0.002	0.0002	CDII Surface Water; Drinking Water Standard is applicable	ARAR is exceeded
Nickel	1.1827	0.2	0.04	CDII Agriculture Standard is applicable	ARAR is exceeded
Selenium	3.2	0.01	0.005	CDII Surface Water; Drinking Water Standard is applicable	ARAR is exceeded
Strontium	2.9066	NS	0.2	No Standard	Background is TBC
Thallium	0.01	0.01U	0.01	RCRA Subpart F is NAA	ARAR is exceeded
Zinc	2.4559	2	0.02	CDII Agriculture Standard is applicable	ARAR is exceeded
<b>Conventional Pollutants</b>					
pH	5.6 - 8.5	6.5 - 9.0	0.1	CDII Ground Water Standard is applicable	ARAR is exceeded
Nitrate	55	10	5	CDII Ground Water Standard is applicable	Analytical results are total nitrate nitrogen. Results indicate that nitrate ARAR is exceeded.

Table 4-2

**CHEMICAL SPECIFIC ARAPIs FOR COMPOUNDS  
AND ELEMENTS DETECTED AT TIE 001 HILLSIDE AREA\***

Chemical Organic Compounds	Maximum In 001 Hillside Area Alluvial Ground Water(a)	ARAP (µg/l)	Detection Limit (µg/l)	Standard Criteria or Guidance	Comment
Carbon Tetrachloride	2400J	5	5	CDII Surface Water; Drinking Water Standard is applicable	ARAP is exceeded
1,1 Dichloroethane	180J	5U	5	RCRA Subpart F, Appendix IX Substance is TBC	TBC is exceeded
1,2 Dichloroethane	17J	5	5	CDII Surface Water; Drinking Water Standard is applicable	ARAP is exceeded
1,1 Dichloroethene	7800J	7	5	CDII Surface Water; Drinking Water Standard is applicable	ARAP is exceeded
Methylene Chloride	17B	5U	5	RCRA Subpart F is N/A	ARAP is exceeded
Tetrachloroethene	5800J	10	5**	CDII Surface Water; Fish and Water Ingestion Standard is applicable	ARAP is exceeded
1,1,1 Trichloroethane	15000	200	5	CDII Surface Water; Drinking Water Standard is applicable	ARAP is exceeded
1,1,2 Trichloroethane	47J	10	5**	CDII Surface Water; Fish and Water Ingestion Standard is applicable	ARAP is exceeded
Trichloroethene	11000	5	5	CDII Surface Water; Drinking Water Standard is applicable	ARAP is exceeded
Chemical Metals	Maximum In 001 Hillside Area Alluvial Ground Water(a)	ARAP (µg/l)	Detection Limit (mg/l)	Standard Criteria or Guidance	Comment
Antimony	0.0768	0.06U	0.06	RCRA Subpart F is N/A	ARAP is exceeded
Calcium	355.00	NS	5	No Standard	No comments
Cesium	0.04J	NS	1	No Standard	Background is TBC
Chromium III	0.0782	0.05	0.01	CDII Surface Water; Drinking Water Standard is applicable	Analytical result is total chromium ARAP may be exceeded

Table 4-2  
CHEMICAL SPECIFIC ARARs FOR COMPOUNDS  
AND ELEMENTS DETECTED AT THE 001 HILLSIDE AREA\*

Chemical	Maximum In 001 Hillside Area Alluvial Ground Water(s)	ANAR (µg/l)	Detection Limit (mg/l)	Standard Criteria or Guidance	Comment
Conventional Pollutants Con't					
Chloride	838	250	5	CDII Ground Water Standard is applicable	ANAR is exceeded
Sulfate	700	250	5	CDII Ground Water Standard is applicable	ANAR is exceeded
TDS	2374	400	5	CDII Ground Water Standard is applicable	ANAR is exceeded
Chemical Radionuclides	Maximum In 001 Hillside Area Alluvial Ground Water(s)	ANAR (µg/l)	Detection Limit (pCi/l)	Standard Criteria or Guidance	Comment
Gross Alpha	319	7	2	CDII Surface Water Standard is applicable	ANAR is exceeded
Gross Beta	286	6	4	CDII Surface Water Standard is applicable	ANAR is exceeded
Pu238, 239, 240	<0.01(c)	0.05	0.01	CDII Surface Water Standard is applicable	ANAR is NOT exceeded
Am241	<0.01(c)	0.05	0.01	CDII Surface Water Standard is applicable	ANAR is NOT exceeded
U13	777	500	400	CDII Surface Water Standard is applicable	ANAR is exceeded
Sr89, 90	5.6	8	1	CDII Surface Water Standard is applicable	ANAR is NOT exceeded
Uranium Total	59.9	5	1.0	CDII Surface Water Standard is applicable	ANAR is exceeded

Notes:

(a) - Maximum compound concentrations determined from first and second quarter 1989 data.

(b) - Maximum compound concentrations determined from 1987 and 1988 data base.

(c) - Below minimum detectable activity (MDA)

U - Detection Limit

J - Estimated below detection limit

B - Compound also present in blank

TOC - To be considered

.. - Not to be considered

.. - Detection limit exceeds ANARs



TABLE 4-3

Results of Soil Sampling Program - 891 Building Site, 1st Quarter 1990 [7]

<u>Sample Number</u>	<u>Surface Characteristic</u>	<u>Pu-239 dpm/gr</u>	<u>Pu-239 pCi/gr</u>
1	Grass	1.621	0.73
2	Grass	1.818	0.82
3	Scraped Soils	0.274	0.12
4	Roughened Soils	2.663	1.20
5	Roughened Soils	4.056	1.83
6	Scraped Soils	0.487	0.22
7	Subsurface Soils (excavated area)	0.107	0.05
8	Scraped Soils	0.429	0.19

TABLE 4-4

## 001 HILLSIDE 1980 SURFACE SCRAPE SAMPLING RESULTS

## RADIONUCLIDE CONCENTRATION IN pCi/g

Sample #	SWMU #	Uranium-233+234	Uranium-238	Plutonium
001-1	119.2	0.56±0.26	0.6±0.15	4.3±0.5
001-2	119.2	0.78±0.26	0.86±0.15	2.4±0.2
001-3	119.2	0.82±0.26	0.91±0.15	4.8±0.5
001-4	119.1	1.0±0.3	0.97±0.2	0.18±0.006
001-5	119.1	0.86±0.26	0.88±0.15	0.59±0.008
001-6	119.2	1.5±0.3	5.5±0.5	2.2±0.2
001-7	104/130	0.74±0.26	0.75±0.15	0.63±0.08
001-8	Note 2	0.86±0.26	0.82±0.15	1.8±0.2
001-9	103	3.1±0.3	1.0±0.2	0.47±0.006
001-10	Note 3	1.1±0.3	0.98±0.2	3.5±0.4
001-11	Note 3	1.0±0.3	1.3±0.2	2.6±0.3
001-12	Note 4	0.93±0.26	1.4±0.2	0.4±0.06
001-13	Note 4	0.94±0.26	1.3±0.2	0.16±0.06
001-14	Note 5	1.1±0.3	1.0±0.2	3.0±0.4
001-15	107	2.0±0.3	1.5±0.16	0.01±0.06
001-16	119.1	50±190	1300±100	0.3±0.06
001-17	119.1	19±74	590±70	0.78±0.19
001-18	119.1	60±230	3000±300	0.42±0.08
001-19	119.1	10±740	550±60	0.09±0.06

## Notes:

1. Source: Draft Phase III Workplan - 001 Hillside Area
2. Sample located northwest of SWMU 104
3. Sample located between SWMUs 119.1 and 119.2
4. Sample located southwest of SWMU 119.1
5. Sample located between SWMUs 102 and 103

**Table 4-5**  
**THRESHOLD LIMIT VALUES FOR NOISE<sup>1</sup>**

Duration per Day Hours	Sound Level dBA <sup>2</sup>
16	80
8	85
4	90
2	95
1	100
1/2	105
1/4	110 <sup>3</sup>
1/8	115 <sup>3</sup>

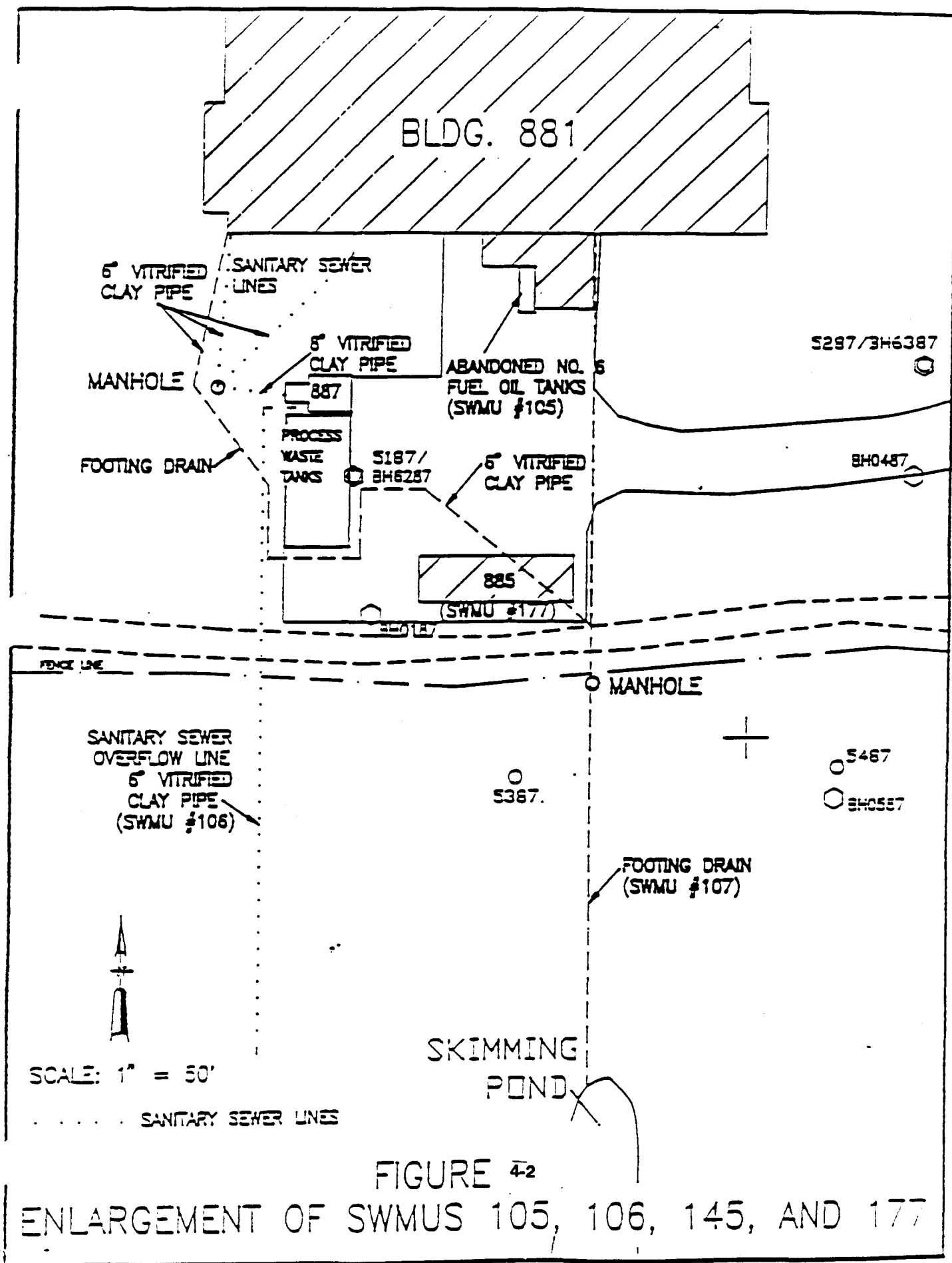
1. From "Threshold Limit Values and Biological Exposure Indices for 1989-1990". American Conference of Governmental Industrial Hygienists. Cincinnati, Ohio.

2. Sound level in decibels are measured on a sound meter, conforming as a minimum to the requirements of the American National Standards Specification for Sound Level Meters, S1.4 (1971 Type S2A, and set to use the A-weighted network with slow meter response).

3. No exposure to continuous or intermittent in excess of 115 dBA.

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FIGURE 4-3 (881 Hillside HSP)

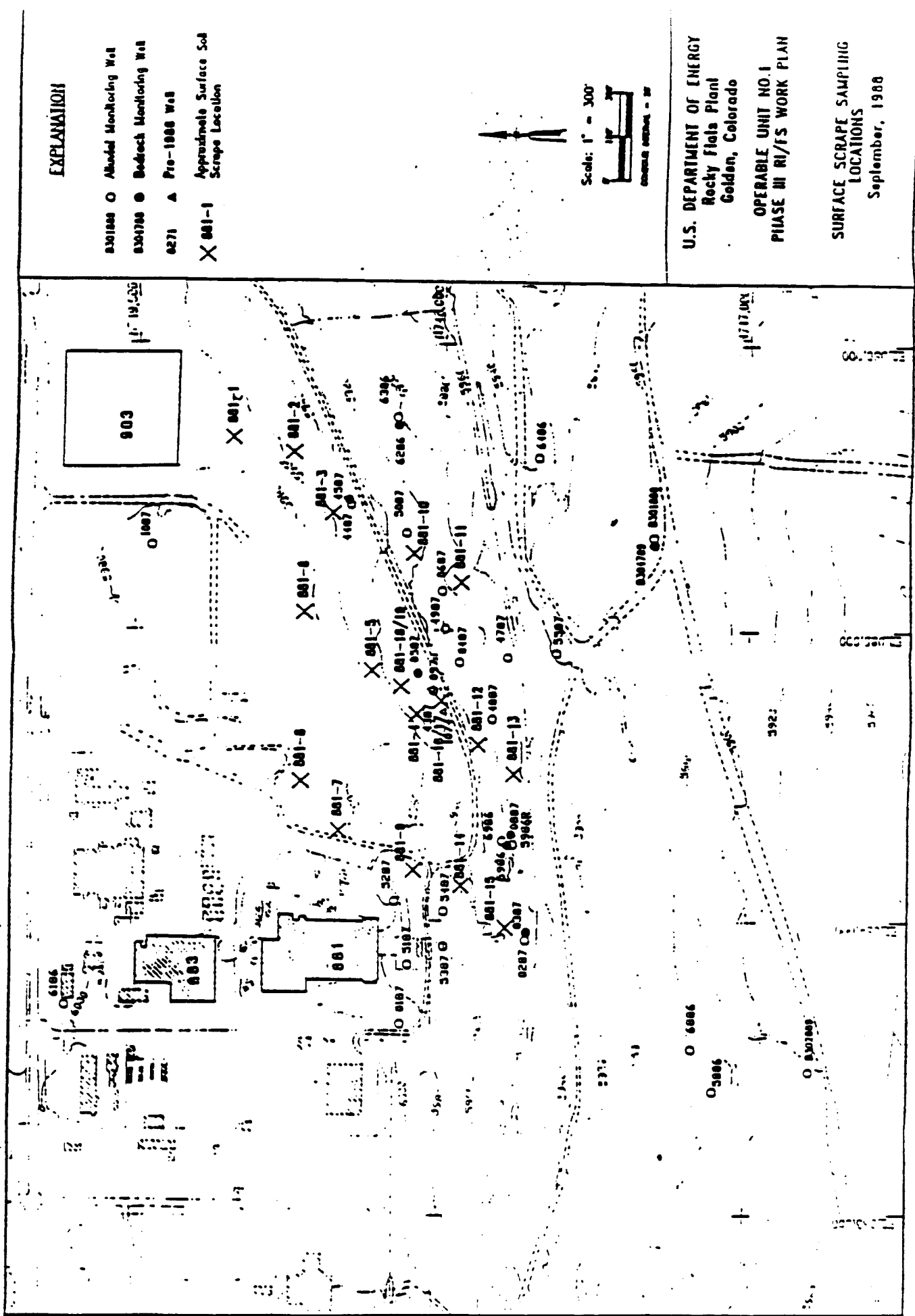
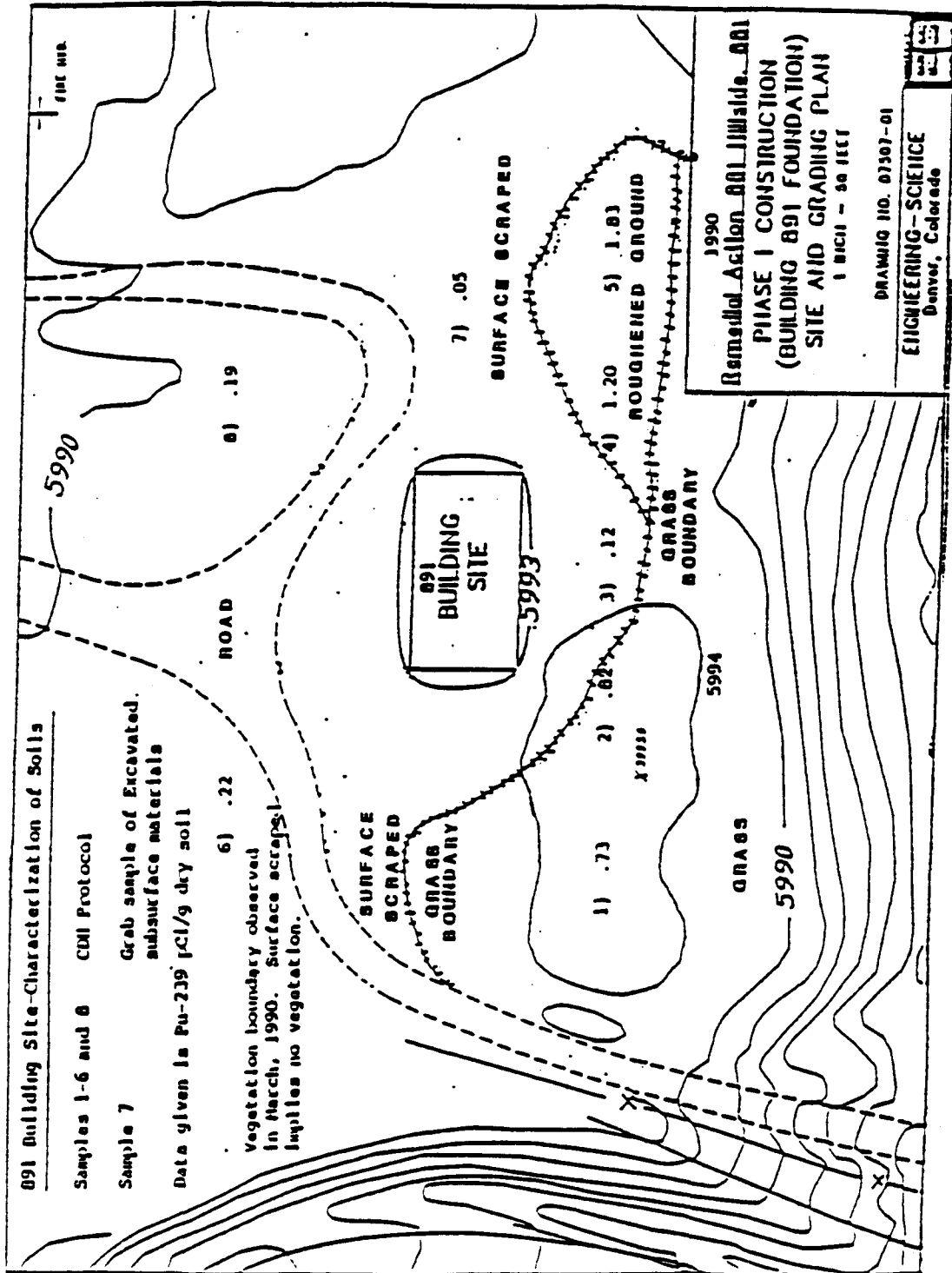


Figure 4.4

Building 891 Site Soil Sampling Locations [7]



#### 4.8 References

- [1] Rockwell International, 1989c, Background Geochemical Characterization Report, U.S. DOE, Rocky Flats Plant, Golden, Colorado, December 15, 1989.
- [2] Department of Energy, 1990, Draft Phase III RI/FS Work Plan - 881 Hillside Area, Rocky Flats Plant, Golden, Colorado, February, 1990.
- [3] Department of Energy, 1989, Environmental Assessment for 881 Hillside (High Priority Sites), Interim Remedial Action, November 30, 1989 Draft Version, DOE/ERA 0413.
- [4] Rockwell International 1987b, Annual Environmental Monitoring Report: June - December 1986, RFP-ENV-86, Rockwell International, Rocky Flats Plant, Golden, Colorado.
- [5] Rockwell International, 1987a, Draft Remedial Investigation Report for High Priority Sites (881 Hillside Area), U.S. DOE, Rocky Flats Plant, Golden, Colorado.
- [6] American Conference of Government Industrial Hygienists, 1989, Threshold Limit Values and Biological Exposure Indices for 1989-1990. ACGIH, Cincinnati, OH.
- [7] Internal Memo from Ron Zuck to Tom Greengard, Subject: Soil Sample Results of 891 Building Site, dated May 23, 1990.



## 5.0

## HAZARD COMMUNICATION

WESTON shall maintain a hazard communication program consistent with the requirements of 29 CFR 1910.1200. The individual responsible for the program shall be the SHSC. The SCHC shall notify the EG&G Industrial Hygiene Department of any chemical substances required of the job and shall maintain an on-site file of Material Safety Data Sheets (MSDS) for those products. The pertinent information addressed on each new MSDS shall be discussed with the work force at the weekly safety meeting. Special training sessions shall be provided for new hires and subcontractors which address the hazards and safe use of chemical products prior to those workers being authorized use of the products. All chemical product containers shall be labelled with the name of the product and an assessment of potential hazards associated with its use.

## **6.0 SITE CONTROL**

### **6.1 Objectives**

The purpose of this site control plan is to protect workers, the public, and the environment from the potential hazards associated with the 881 Hillside environmental restoration work. The OSHA hazardous waste operations standard, 29 CFR 1910.120, stipulates that a site control plan will include a site map, identification of site work zones, a description of site communications, the requirements for the use of a buddy system, safe work practices and identification of the nearest medical facility.

The 881 Hillside, located in the southeast portion of the plant (see Figure 1-2) is an access controlled area because of clean-up operations and sampling of potentially contaminated soil, ground water and surface water. Background data collected during the Remedial Investigations/Feasibility Study (RI/FS) process (see Section 4) indicate the presence of elevated levels of organic and inorganic chemicals and radionuclides in the soil and ground water at the site.

The terms "site control" and "controlled" versus "uncontrolled" are used in this section in the context of hazardous waste sites. This OSHA terminology do not necessarily apply to formal radiological definitions used in the Rocky Flats Plant (RFP) production facilities.

In addition to site control measures required under the OSHA 1910.120 standard, activities conducted on the 881 Hillside are also restricted by the RFP Integrated Work Control Package (IWCP) System.

### **6.2 Site Control Designations**

Two site control designations are used at the site. The entire Operable Unit is designated as a "Restricted Area" and the Solid Waste Management Units (SWMUs) are designated as "Controlled Areas". Access into these areas will be controlled, appropriate PPE will be required, and personnel working in the areas must meet specific training requirements and be participants in a medical surveillance program. Minimum requirements for access into these designated areas are summarized below. Detailed PPE, training, and decontamination requirements are presented in the respective sections of the HASP.

#### **6.2.1 Restricted Area**

The entire area identified as Operable Unit 1 (881 Hillside) will be designated and posted as a "Restricted Area". All personnel conducting activities or supervising activities in this area are required to provide documentation of OSHA and Radiation Worker training (as described in Section 10) and medical clearance. The OSHA training requirement (29CFR 1910.120 (e)) is applicable to EG&G and subcontractor personnel at the site because the data compiled in the RI/FS indicate potential contamination in ground water and surface soils beyond the SWMU boundaries. Signs designating the "Restricted Area" will be posted along the road which passes through the site and along the area boundaries

### **6.2.2 Controlled Areas**

All the SWMU's within the 881 Hillside area will be designated as "Controlled Areas". Environmental samples collected in these sites contained elevated levels of radiological and/or chemical contaminants. Personnel entering these areas will be required to utilize a sign-in/sign out sheet and wear PPE. When leaving these areas, decontamination procedures (described in Section 7), including clearance by either EG&G Radiation Protection Technicians (RPTs) will be followed. The delegation of radiation monitoring responsibilities shall be made at EG&G's discretion.

Uranium-238 was detected in surface soil samples collected in SWMU 119.1 at concentrations which range from  $0.88 \pm 0.15$  pCi/g to  $3000 \pm 300$  pCi/g (See Table 4-4). In addition to the PPE required within the SWMU's, Radiological Engineering or the SHSC may determine that respiratory protection is required in SWMU 119.1.

The SWMU's will be identified by appropriate markings and barriers. Signs will be posted stating the area is "Controlled and will identify the SWMU number.

### **6.2.3 Task Specific Exclusion Zones**

During sampling and restoration activities at the 881 Hillside, exclusion zones will be established by the SHSC. The limits of these zones and the PPE requirements within the zones shall be determined for all WESTON employees and subcontractors on the basis of the hazards of the work being conducted as determined by the SHSC. Visitors and observers will comply with the site control designations and the zone requirements established at the worksite. Visitors will not be allowed to enter the exclusion zone without verification of training and medical clearance.

## **6.3 General Operating Procedures**

Standard safety guidelines for site personnel are outlined in the Rocky Flats Plant Health and Safety Practices Manual. Specific requirements, applicable to personnel at the 881 Hillside, including a description of the site communication system and the requirements of the buddy system, are described in this section.

WESTON personnel will not conduct work activities alone on the 881 Hillside. They will be accompanied by either another EG&G or subcontractor employee. The "Buddy System", as specified in 29 CFR 1910.120 (d) (3), will be implemented at the site. The buddy teams working at the site will maintain visual and audible contact so that they may provide emergency assistance to each other, if needed. Both members of the buddy team need not be in the same site zone, but each member must be wearing adequate PPE to assist the other member if necessary.

Telephones and hand-held radios comprise the communication system at the site. Personnel will have access to telephones in the Jamison Construction Company trailer area, and when on the 881 Hillside, they will rely on the hand-held radio system utilized by subcontractors performing the restoration work.

## **6.4 Medical Assistance**

As described in Section 8, on-site emergency medical assistance is provided by EG&G Emergency Medical Technicians (EMTs) who can be reached by phone or radio. Additional assistance is available through the WESTON medical consultant who can be reached at (303) 758-1482.

## **7.0 ENGINEERING AND ADMINISTRATIVE CONTROLS**

WESTON will incorporate a variety of engineering and administrative controls throughout the project in order to minimize health and safety risks. These controls shall be preferentially used prior to resorting to the use of personal protective equipment.

It is not feasible to discuss each specific control mechanism which may be utilized on the project until decisions of equipment and technique selection are finalized. However, the fundamental engineering and administrative controls planned for the project are described in the following sections.

### **7.1 Trenching and Excavation**

Workers will not be allowed to enter the trench once the depth exceeds four (4) feet until the sides of the trench are adequately supported. Support shall consist of a benching system which involves a series of horizontal levels or steps with vertical or near vertical surfaces between levels or a slope system of 40 degrees as approved by a registered Professional Engineer. An adequate means of exit such as a ladder shall be placed in the trench within 25 feet of the workers.

The atmosphere within the trenches shall be surveyed prior to entry as conditions warrant, but no less than once per day. The atmospheric surveys are described in the air monitoring section of this HASP. Should action levels be exceeded for airborne contaminants, the excavation shall be ventilated with a blower and 12-18 inch vent hose and the area shall be re-surveyed after 15 minutes of ventilating to assess the need for personal protective equipment.

The excavations shall be inspected several times each day by the SHSC or his authorized competent person. The excavated area shall be posted a minimum of 15 feet from the edge with cones or tape to delineate the exclusion zone. Any water collected in the excavation will be removed prior to entry of site personnel.

### **7.2 Procedural Requirements**

The EG&G Integrated Work Control Program (IWCP) and Radiation Work Permit HSP 6.07 shall also be applied as warranted.

### **7.3 Fire Protection**

EG&G shall provide fire protection to WESTON in the form of on-site fire fighting services. WESTON shall be prepared to initiate control of incipient stage fires through the availability of ABC dry chemical extinguisher mounted on mobile equipment and in the office trailers.

### **7.4 Safe Work Practices**

#### **7.4.1 Hazard Reporting**

All personnel shall immediately bring to the attention of the SHSC, or other supervisory personnel, any condition practice, or circumstance they feel is unsafe.

#### **7.4.2 Health and Safety Equipment Repair and Alteration**

Personnel shall not alter or attempt to repair any safety equipment unless specifically authorized by the SHSC.

#### **7.4.3 Drugs and Alcoholic Beverages**

Possession or use of alcoholic beverages or drugs on-site is prohibited. Employees may not report for work or perform duties while under the influence of intoxicants or drugs. The consumption of alcoholic beverages also should be avoided during off-duty hours for the duration of site activities

#### **7.4.4 Buddy System**

Personnel engaged in activities within the Exclusion Zone shall use the "buddy " system. Buddies should prearrange hand signals for communication. Communication or visual contact shall be maintained between crew members at all times.

#### **7.4.5 Food, Drink, Tobacco Use, Chewing, Cosmetic Application and Oral Medication.**

Activities which increase the probability of hand-to-mouth transfer, ingestion or inhalation of material are prohibited on-site except in designated areas (lunch rooms).

#### **7.4.6 Personal Hygiene**

All personnel must wash hands and face thoroughly upon leaving known or suspected contaminated areas prior to eating or smoking activities.

#### **7.4.7 Facial Hair**

Hair which interferes with a satisfactory fit of the mask-to-face seal (i.e., more than one day's growth, beards or large sideburns) is NOT allowed on personnel required to wear or who must be prepared to wear face sealing respirators (1/2 mask and full face piece respirators).

#### **7.4.8 Contaminated Surfaces**

Contact with contaminated surfaces or with surfaces suspected of being contaminated should be avoided. Whenever possible, site personnel required to wear or who must be prepared to wear face sealing respirators (1/2 mask and full face piece respirators).

#### **7.4.9 Contact Lenses**

Personnel will not be permitted to wear contact lenses while performing site activities outside the support area.

#### **7.4.10 Fire Extinguishers**

A sufficient number of fire extinguishers with a minimum rating of A:B:C shall be strategically located throughout the areas where active work is progressing to ensure the travel distance required is less than 75 feet.

#### **7.4.11 Emergency Procedure Information**

The location, telephone number, and directions to the RFP emergency medical facility will be conspicuously posted in the support Zone.

#### **7.4.12 Site Entry**

Entrance onto the site without formal authorization from the Superintendent is prohibited.

#### **7.4.13 Standby Personnel**

Conducting site operations within the SWMUs without standby personnel in the Support Zone is prohibited. The SHSC may exercise judgement regarding the need for stand-by personnel at sites that have been repeatedly entered or occupied without apparent harm. In any case where doubt exists, stand-by personnel must be present.

#### **7.4.14 Exposure Minimization**

Personnel and equipment in the contaminated area should be kept to a minimum, consistent with effective site operations.

#### **7.4.15 Exposure Monitoring**

Monitoring of airborne contaminants by direct reading instrumentation (PID, FID, explosimeter, etc.) or other means will be employed by the JCC HSO to evaluate the conditions at the site during the course of site activities (Refer to Section 10.0). The JCC HSO has the authority to shut down site operations or modify, as necessary, the operational practices and PPE employed to ensure the safety of site personnel, based upon results of site monitoring. WESTON personnel will not enter the excavation until authorized by the JCC HSO.

#### **7.4.16 Combustible Gases**

If the presence of combustible gases is indicated, but readings are less than 10% LEL, area and operational surveys will be conducted to determine the source. If levels exceed 20% LEL, personnel must be withdrawn and the situation reassessed by the JCC HSO to determine the course of action to be taken.

#### **7.4.17 Foul Weather**

On-site operations will be discontinued during heavy precipitation or during periods of strong or gusty winds. Strategically located and readily visible wind speed and direction indicators should be used to monitor wind.

#### **7.4.18 Thunderstorms**

No operations will be permitted during thunderstorms or electrical storms. Whenever an electrical storm approaches the site, personnel will be evacuated from locations that are lightning hazards.

#### **7.4.19 Personnel Decontamination**

The personnel decontamination requirements for each work site or operation will be discussed during safety briefings.

**7.4.20 Entrances and Emergency Escape Routes**

Entrance and exit locations, and emergency escape routes must be clearly designated.

**7.4.21 Communication Procedures**

Normal and emergency communications procedures must be reviewed prior to each day's work. There shall be radio communications between the support trailer and designated workers within the exclusion zone. Emergency contacts can be made according to the procedures discussed in Section 12.

## 8.0

## PERSONAL PROTECTIVE EQUIPMENT

The use of personal protective equipment (PPE) is required when engineering and administrative controls are insufficient to prevent worker exposures to hazardous chemicals and radioactive materials. Due to the nature of work performed on the 881 Operable unit, there is a potential for the release of vapors and particulates which can not be completely controlled at the source. Engineering and administrative controls will be used, when appropriate, to minimize potential exposures (Section 7.0), however, the use of PPE is necessary to maintain exposures as low as reasonably achievable (ALARA). WESTON shall provide and maintain all PPE for WESTON employees. The JCC written PPE program is included in Appendix B.

## 8.1

### PPE Issues Applicable to All Site Personnel

All personnel assigned to the 881 Hillside must be trained in the proper inspection and use of PPE before beginning work on the site. For workers required to wear respiratory protection, this training requirement is fulfilled through the completion of the 40 hour OSHA course discussed in Section 10, Training. All JCC and subcontractors required to wear a respirator must be quantitatively fit tested at least annually per OSHA/ANSI protocols.

All personnel assigned to the 881 Hillside must have a current medical "fit-for-duty" clearance issued by the WESTON medical consultant and/or the subcontractor's medical consultant. This clearance will be updated annually with the employee's physical exam as described in Section 10, Medical Surveillance. Medical "fit-for-duty" clearances for all site personnel shall remain on file at the site. PPE may not be used if the medical clearance has expired.

Workers required to use PPE must do so in buddy teams. The team members are responsible for the inspection of each others' equipment during donning and during field use. An inspection checklist is presented in Table 8-1.

Workers experiencing any unusual symptoms of fatigue, dizziness, high body temperature, skin or respiratory irritation, or suspected overexposure should immediately withdraw from the work area and go through decontamination. The employee should then notify his/her supervisor and the incident should be reported immediately by the supervisor to the Occupational Health department and Industrial Hygiene.

## 8.2

### Restricted Areas

The entire 881 Hillside (Operable Unit 1) is designated and posted as a "Restricted Area". The exclusion work zone shall be delineated with barricade tape and a sign and poster board shall be mounted at the entrance of the zone (see Section 5). Minimum "Level D" PPE is required for anyone entering this area including safety shoes, cotton type coveralls, Class I eye protection with side shields, and a hard hat. Each designated work zone within the "Restricted Area" may have additional PPE requirements which must be met by anyone requiring access to the area. The SHSC shall determine additional PPE requirements for WESTON employees and subcontractors as warranted.



**TABLE 8-1  
GENERAL PPE INSPECTION CHECKLISTS**

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**LEVEL D CLOTHING**

**Before use:**

- Determine that the clothing material is correct for the specified task at hand.
- Visually inspect for:
  - Imperfect seams
  - non-uniform coatings
  - tears
  - malfunctioning closures
- Hold up to light and check for pinholes
- Flex product:
  - observe for cracks
  - observe for other signs of shelf deterioration
- If the product has been used previously, inspect inside and out for signs of chemical degradation:
  - discoloration
  - observe for other signs of shelf deterioration
- If the product has been used previously, inspect inside and out for signs of chemical degradation:
  - discoloration
  - swelling
  - stiffness

**During the work task, periodically inspect for:**

- Evidence of chemical attack such as discoloration, swelling, stiffening, and softening. Keep in mind, however, that chemical permeation can occur without any visible effects.
- Closure failure
- Tears
- Punctures
- Seam discontinuities

**GLOVES**

BEFORE USE, pressurize glove check for pinholes. This can be accomplished by infiltrating the glove and holding it under water. No air should escape.

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### **8.3 Solid Waste Management Units**

WESTON personnel will not enter excavations which intrude on solid waste management units.

### **8.4 Re-Use of PPE**

Tyvek coveralls may be used for the duration of the work period. However, Tyvek should be removed and disposed of during decontamination whenever a worker leaves the exclusion or contamination reduction zone (CRZ). The length of the service life of a respirator cartridge will be determined by the SHSC. This time period may be shortened if the cartridge becomes saturated with moisture, breathing resistance is excessive, or chemical odors are detected by the worker.

The SHSC shall conduct spot inspections of the PPE inspection and maintenance program.

**9.0****DECONTAMINATION**

The objective of decontamination is to remove hazardous substances from workers and equipment, to assure compliance with DOE order 5480.11 and OSHA Standard 1910.120, and to preclude the occurrence of potential adverse health effects that could be caused by contact with hazardous materials. Decontamination requirements and procedures at the 881 Hillside will vary according to the task being performed and the hazardous materials encountered.

**9.1****Decontamination Requirements**

Decontamination will be required of personnel and equipment which contact excavated materials, ground water, and/or dust emissions from excavations outside the SWMUs. Level D-2 decontamination shall take place at the designated contamination reduction zone adjacent to the shower facility. It will consist of removal of boot covers, gloves (if applicable), Tyvek coveralls, hard hat, and eye protection; and a minimum of hand and face wash prior to leaving the work site. Inner cotton coveralls may be worn temporarily off site. Inner cotton coveralls may be worn temporarily off site (but not off RFP property) for RFP related tasks, lunch, breaks, etc. Personnel must shower at the end of each shift and leave cotton coveralls on-site for isolated laundering.

**9.2****Use of Decon Shower**

The decon shower is designed to be operated in a open loop manner whereby individuals will enter the shower through a one-way point following the preliminary decon described in 8.2. The worker will be frisked prior to removing the cotton coveralls in the trailer entry area, then shower/shampoo in the shower facility, dry off in the shower exit area, and step into the clean area where he/she may dress in their personal clothes.

All site clothing and towels shall be bagged, as separate, for pickup and laundry by EG&G. The EG&G Project Manager is responsible for ensuring that all decon water, laundry and collected ground water associated with the operation is managed correctly.

## **10.0 MEDICAL SURVEILLANCE**

The medical surveillance requirements of OSHA (29CFR 1910.120(f) ) provide the framework for a medical monitoring program for workers involved in hazardous waste operations and emergency response. The standard includes provisions for baseline, periodic and termination medical examinations to monitor for potential exposures to hazardous materials and conditions.

### **10.1 Medical Surveillance Requirements**

All site personnel performing work in areas either suspected or known to be contaminated with chemicals will be required to participate in medical surveillance program. The WESTON medical program satisfies the requirements of medical surveillance identified by this plan. A release for work will be verified for each individual by the Health and Safety Officer before an employee or subcontractor can begin on-site activities.

A medical exam will be administered to each employee prior to the onset of any work on site and upon termination of employment. Episodic examinations may also be required, at the discretion of the SHSC.

All WESTON personnel will be issued a thermoluminescent dosimeter badge to be worn at all times on the site.

### **10.2 Availability of On-Site Service**

The RFT Occupational Health Department is located in Building 122. The full staff is on duty from 7:30 a.m. to 4:00 p.m. Monday thru Friday. The registered nursing staff is on duty from 6:30 a.m. on Monday, through 10:00 p.m. on Friday. A physician and a nurse are always on call for any emergency during off hour. Weekend coverage (Friday, 10:00 p.m. through Monday, 6:30 a.m.) is provided by emergency medical technicians (EMT's). They can be contacted at Extension 4336 and will meet employees in the Occupational Health Department or respond to the site of any emergency.

### **10.3 Transportation for Medical Reasons**

The company will provide transportation for employees (if it is medically safe as determined by the Occupational Health Staff) to their home or to an appropriate medical facility for:

- an emergency: Occupational Health/EMTs will determine the appropriate mode of transportation for illness/ injury requiring air or ground ambulance transport,
- or
- a non-emergency: if there is no medical necessity for ambulance transport, supervisors will be asked to arrange transportation.

In a situation where an employee is injured and requires non-ambulance transport to an off-site medical facility, the supervisor or designee shall accompany that person as a representative of the company and be available to interface with outside authorities (if necessary), and to provide further transportation for the employee as appropriate. Supervisors unable to arrange transportation on weekends or during night work should contact the Shift Superintendent for assistance.

#### **10.4 Employee's Responsibility**

Medical surveillance requirements are not only the responsibility of the Superintendent and HSO, but also the responsibility of each employee. These responsibilities include:

- advising their supervisors of any physical or mental conditions which could affect work performance;
- recognizing the detectable signs or symptoms of over-exposure to chemical or physical hazards; and
- reporting all occupational injuries or illnesses immediately.

#### **10.5 Medical Records**

All medical information including laboratory reports, EKG reports, X-ray reports, health histories, physical examination letters, and reports from employee's personal or referral physician will be maintained by the WESTON Medical consultant, in the individual's file. All WESTON personnel have access to their medical records by contacting the Corporate Health and Safety Department.

## **11.0 AIR MONITORING**

The monitoring procedures for WESTON personnel working on the 881 Hillside include those for chemical contaminants and for radiological contaminants. The objectives of the monitoring program are:

- to characterize dusts, mists, fumes, gasses, and vapors present in the 881 Hillside work areas;
- to acquire sufficient quantitative data which will be used to determine appropriate levels of personal protective equipment, site control measures and boundaries, decontamination procedures; and
- to identify conditions that may be immediately dangerous to life or health.

Since WESTON's site specific tasks are relatively non-intrusive compared to those of Jamison Construction Company, It has been agreed by JCC and EG&G that WESTON will rely on the JCC air monitoring program to ensure Health and Safety. The following air monitoring programs is extracted from the JCC SHERP.

### **11.1 Chemical Related Air Monitoring**

#### **11.1.1 Sampling Strategy**

The JCC Health and Safety Officer will survey the perimeter of the site during excavation to determine airborne concentration of volatile organic compounds (VOC) Similarly, this person will survey the excavation itself prior to entry by site personnel. If VOC are detected at levels above background, WESTON personnel will evacuate to a position upwind where exposures do not exist. WESTON personnel will not work in locations where airborne contaminants exceed established Level D action levels.

EG&G shall conduct dust concentration monitoring in the field during excavation of the surface soil per "Excavation Plan for the 881 Hillside French Drain" dated 7/26/91.

JCC shall conduct vapor exposure surveys periodically during excavation activities (i.e., at least hourly) outside of the SWMUs and continuously during the excavating of the SWMUs. These surveys shall consist of real time organic vapor monitors supplemented with the use of colorimetric tubes.

### **11.1.2 Radiological Monitoring**

Radiological monitoring involves the detection and measurement of alpha, beta, and gamma radioactivity. The monitoring shall be conducted for airborne radionuclides, surface contamination, and internal contamination of equipment. EG&G shall provide radiation monitoring, with support provided by the JCC HSO and CIH. EG&G will provide radiologic screening of dirt spoils as they are excavated and will screen the excavation prior to entry by WESTON personnel.

### **11.2.1 Air Monitoring**

Environmental radiological contamination control programs will be initiated, as necessary, through a Radiological Work Permit (RWP) as specified in EG&G Health and Safety Practice (HSP) 6.07 and Radiological Operating Instruction (ROI) 11.1.

### **11.2.2 Decontamination Verification**

Prior to exiting the "Controlled Area", personnel shall survey for alpha and beta/gamma using Bicon FriskTech or EG&G approved instruments using A-100 and B-30 probes. Personnel monitoring techniques specified in ROI 2.01 and the RMP shall be employed. Equipment must be smear surveyed for alpha and beta/gamma. Smears shall be counted in Eberline SAC-4 and BC-4 smear counters. Equipment will also be surveyed directly using Bicon A-100 and B-50 probes. No property shall be released for unrestricted use if any single reading is in excess of the limits stated in HSP 18.10 and ROI 3.02.

### **11.2.3 Surface Contamination Surveys**

Radiological Operations is responsible for overseeing routine contamination surveys at 881 Hillside. The frequency of such surveys is based on the judgement of the responsible Radiological Engineer. The specific methodologies associated with surface contamination surveys are described in the Radiological Operating Instruction (ROI) 3.1. Contamination control limits for alpha and beta/gamma surface activity, as specified in the ROI, are listed in Tables 11-3 and 11-4.

Table 11 - 3

Derived Air Concentrations (DAC) for Controlling Radiation Exposures to Workers at DOE Facilities,  
from Attachment 1, Page 4 of DOE Order 5480.11 dated 12-21-88

Inhaled Air - Lung Retention Class

Radionuclide	D (uCi/mL)	W (uCi/mL)	Y (uCi/mL)	Stochastic or Organ <sup>1/</sup> (D/W/Y)
H-3 (Water) <sup>2/</sup>	2.E-05	2.E-05	2.E-05	St/St/St
H-3 (Elemental) <sup>2/</sup>	5.E-01	5.E-01	5.E-01	St/St/St
Pu-239	-	2.E-12	6.E-12	- /BS/BS
Am-241	-	2.E-12	-	- /BS/BS
U-233	5.E-10	3.E-10	2.E-11	BS/St/St
U-234	5.E-10	3.E-10	2.E-11	BS/St/St
U-238	6.E-10	3.E-10	2.E-11	BS/St/St

<sup>1/</sup> A determination of whether the DACs are controlled by stochastic (St) or nonstochastic (organ) dose, or if they both give the same result (E) for each lung retardation class is given in this column. The key to the organ notation for nonstochastic dose is: BS = Bone Surface, K = Kidney, L = Liver, Sin = Stomach wall, and T = Thyroid. A blank indicates that no calculations are performed for the lung retention class shown.

<sup>2/</sup> The ICRP identifies tritiated water and carbon as having immediate uptake and distribution; therefore, no solubility classes are designated. For purposes of this table, the DAC values are shown as being constant, independent of solubility class. For irritated water, the inhalation DAC values allow for an additional 50% absorption through the skin, as described in ICRP Publication No. 30: Limits for intakes of Radionuclides by Workers. For elemental tritium, the DAC values are based solely on consideration of the dose-equivalent rate to the tissues of the lung from inhaled tritium gas contained within the lung, without absorption in the tissues.

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**Table 11-4**  
**Contamination Control Limits**

<u>AREA</u>	<u>REMOVABLE ALPHA</u>		<u>FIXED AND REMOVAL ALPHA</u>
	<u>Smears</u> (DPM/100CM <sup>2</sup> )	<u>Swipes</u> (cpm by Ludlum 12-1A)	(cpm by Ludlum 12-1A)
Uncontrolled	< 20	N/A	< 250
Controlled	< 20	N/A	< 250
Radiological	20-200	< 250	250-750
Contamination	> 200	< 250	> 750

<u>AREA</u>	<u>REMOVABLE BETA/GAMMA</u> (dpm/100 cm <sup>2</sup> )	<u>FIXED AND REMOVAL BETA/GAMMA</u> (dpm/100 cm <sup>2</sup> )
Uncontrolled	< 100	< 5000
Controlled	< 1000	< 5000
Radiological	1000-5000	≥ 5000
Contamination	> 5000	

## **12.0 EMERGENCY RESPONSE**

(Reproduced from the EG&G 881 Hillside Health and Safety Plan)

### **12.1 Purpose**

The purpose of the Emergency Response Plan for the 881 Hillside is to have a detailed, predetermined strategy for handling potential emergency situations. Pre-emergency planning is required to expedite appropriate action, thereby minimizing the severity and consequences of potential emergencies. The plan is designed to protect site personnel from possible hazards created by emergency situations. In addition to safeguarding site personnel, the plan is designed to protect plant personnel and the public from contaminants that could move off site, protect property adjacent to the 881 Hillside area and protect equipment loss from hazards associated with 881 Hillside activities. This section details procedures to be followed during an emergency at the 881 Hillside site.

It is critical that key personnel are informed immediately of emergency situations so that response efforts can be carried out effectively. Success will depend on the efforts of appropriate personnel and the input they can provide as a result of training and experience. Teamwork is crucial for abating hazards and minimizing damage.

Emergency assistance should always be requested when it is unclear whether there is a need for support personnel. The contacted party can decide after hearing a description of the problem or after observing the situation whether or not they are needed.

### **12.2 Notification**

#### **LIFE-THREATENING EMERGENCIES – CALL EXTENSION 2911**

#### **NON-LIFE THREATENING EMERGENCIES – CALL EXTENSION 2914**

Notification requirements for emergency situations at the 881 Hillside depend on the nature of the perceived emergency (e.g., spill, injury, illness, fire, etc.) and the extent to which the damage and/or injuries have progressed. Upon discovery of a release of materials or other non-life-threatening emergency situation, immediately notify the on-site supervisor at extension 5355 and the H&S Area Engineer at extension 7578 or pager #330. The supervisor will evaluate the situation and notify appropriate personnel. If the supervisor is not available and the situation is not life-threatening, notify the Shift Superintendent at extension 2914.

If the supervisor is not available or the situation is life-threatening, notify RFP emergency response personnel as detailed below.

Call 2911 to obtain emergency assistance for life-threatening emergencies and to access the:

- **Emergency Coordinator (Shift Superintendent)**
- **Plant Protection Central Alarm Station**
- **Fire Department Dispatch Center; and**
- **Medical Department**

Provide as much detail about the emergency as possible. A decision to dispatch any or all of the following equipment will be made on the information provided:

**FIRE ENGINE  
AMBULANCE  
HAZMAT RESPONSE VEHICLE**

Provide the following information, upon request, to the Emergency Dispatcher:

- Your name
- Exact location of the emergency
- Nature of the emergency
- Condition of the patient, if applicable (breathing, consciousness, bleeding, etc.)
- Special hazards in the area
- Any other information requested

If no details are given, emergency response personnel will respond automatically.

The Emergency Coordinator (EC) will immediately respond to all emergencies. The EC will activate the Emergency Operation Center (EOC) and notify departments that have an advisory role in the situation, if applicable. The EC will determine if additional help from off-site agencies (police, hospitals, etc.) is required.

The EC will also notify the following groups when appropriate:

Radiological Engineering  
Industrial Safety  
Waste Programs  
Event Notification Officer

Industrial Hygiene  
Waste Operations  
Traffic  
H&S Operations

Radiological Engineering and Industrial Hygiene will assess any hazards associated with the release of spilled material. Waste Operations will determine the appropriate clean-up techniques and personnel. Waste Programs will evaluate the incident for RCRA/CERCLA reporting requirements. In the event of a spill, notification must also be made to response and reporting at 7264.

### 12.3 Specific Site Hazards

The response to and abatement of most emergency situations on the 881 Hillside will require the expertise of RFP emergency response personnel. However, spills of hazardous substances with a volume of less than 1 pint or 1 pound can be handled by 881 site personnel provided that EG&G site management are available and supervise the clean-up. Situations which will require the assistance of RFP emergency responders include, but are not limited to:

- battery acid spills,
- skin contact with battery acid,
- accidents resulting in physical injury,
- accidents resulting in a radiological exposure exceeding the following limits:

Whole-body (Penetrating)	-	2 rem
Skin	-	7.5 rem
Extremities	-	15 rem
- chemical exposures exceeding the TLV,
- spills of hazardous wastes with a volume greater than or equal to 1 pint or 1 pound; or

- spills of radionuclides at their respective RQ values,
- fires, and
- explosions.

#### **12.4 Fires and Explosions**

##### **IN THE EVENT OF A FIRE OR EXPLOSION, IMMEDIATELY CALL 2911**

In the event of a fire or an explosion, personnel shall immediately evacuate the area. Evacuation will be a minimum of 300 feet upwind/cross-wind of the emergency. The emergency will be handled by the Fire Department and their designees.

Portable fire extinguishers are available for small, controllable incipient fires. All fires, regardless of size, are to be reported to the Fire Department.

#### **12.5 Spills of Hazardous and Radioactive Mixed Waste and Hazardous Material**

**REPORT TO THE EMERGENCY COORDINATOR AT EXTENSION 2911** all spills greater than one pint or one pound of a hazardous material or waste on the 881 Hillside. The Emergency Coordinator will dispatch the HAZMAT Response Vehicle and any other necessary support personnel.

Spills of less than one pint or one pound of a hazardous waste will be cleaned up by site personnel. Spills onto porous ground will require removal of contaminated dirt as well as the spilled material. The collected material will be placed into a plastic bag and monitored to determine the radioactivity of the waste. Based on existing monitoring and analytical data, all spilled material is expected to be classified as low-level radioactive waste. All spills will be handled according to guidelines as defined in Section HW-11 of the Hazardous and Mixed Waste Resource Conservation Act Standard Operating Procedure Manual.

#### **12.6 Post Emergency Response Equipment Maintenance**

Equipment used in emergency situations will be decontaminated by wiping with a soap solution. Rags used for decontamination will be disposed of as low level radioactive waste. Contaminated heavy equipment utilized in emergencies will be thoroughly decontaminated prior to being released from the site. Subcontractors will follow approved decontamination protocols described in their site-specific health and safety plans for heavy equipment decontamination. A decontamination pad for equipment is currently located northwest of the trailer complex on the 881 Hillside. Equipment will not be released until the monitoring indicates that contaminant levels are less than 20 dpm/100cm<sup>2</sup> and chemical contamination is not present.

#### **12.7 Emergency Equipment Location**

Emergency equipment located on the 881 hillside include First-Aid kits and fire extinguishers. These items are located in the JCC trailer on site. Fire extinguishers are also located in WESTON vehicles and temporarily located on sites where there is a potential for fires (e.g., during welding operations).

## **12.8 Evacuation Plan**

Personnel and visitors on the 881 Hillside will evacuate the area if any of the following occur:

- If a site emergency, such as a fire or chemical spill, develops
- If instructed by site supervision
- If instructed by the Shift Superintendent over the site radio or phone system

After evacuation, each supervisor is required to verify that all employees that he/she supervises are accounted for.

## **12.9 Communication**

There are telephones available in the JCC trailer on the 881 Hillside. In addition, radios are used by JCC field personnel to maintain contact with their Superintendent or other designated persons in the trailers with access to telephones. Radio frequencies are monitored by the plant security system to ensure that response time is minimal in the event of an accident or emergency on site. In the event of a Plant emergency, Central dispatch will notify the trailers and field personnel by phone and radio. If Central Dispatch fails in the attempt to contact anyone on site, a security car will be sent to the site to alert personnel of the emergency.

An air horn shall be located at the JCC trailer. Three blasts of the air horn shall indicate an immediate emergency and all personnel shall come to the designated assembly area to be determined at the weekly safety meetings.

## **12.10 WESTON Emergency Notifications**

WESTON Health & Safety	Michael Bradshaw	(303) 980-6800
WESTON Project Manager	Greg Sherman	(303) 980-6800
WESTON Project Industrial Hygienist	Tome Barrett	(303) 980-6800
WESTON SHSC	Steve Carpenter/ Tim Roberts	(303) 980-6800
EG&G Project Manager	Mark Burmeister	(303) 966-
Site Telephone	Jamison Construction	(303) 966-
EG&G Emergency Response	Life Threatening	(303) 966-2911
	Non-Life Threatening	(303) 966-2914

**13.0****RECORDKEEPING**

The SHSC shall be responsible for all health and safety related recordkeeping. In that regard, the SHSC shall maintain a daily log in a bound field survey book. The log book shall be used to record the following items:

- date
- task(s) of the day, location of task,
- personnel on site per task,
- PPE use (specify all items),
- instrumentation used and calibration results for that day,
- all environmental monitoring data obtained,
- weather conditions,
- engineering and administrative controls employed,
- any symptoms of illness, incidents, or accidents,
- results of the daily site safety inspection, and
- any other health and safety related issues.

**13.1****On-Site Personnel Files**

WESTON shall maintain a file on-site of all project personnel. The contents of these files shall include:

- training records
- medical authorizations for hazardous waste work and respirator use
- respirator fit test records
- documentation of site briefing and HASP review, and
- any special certifications required of the job.